

VERNON A. HERRICK
J. H. T. HERRICK
J. H. T. HERRICK

Col. Joseph A. Hickey

JOSEPH A HICKEY.
ARCHITECT.

310 STRAND BUILDING, PROVIDENCE, R. I.

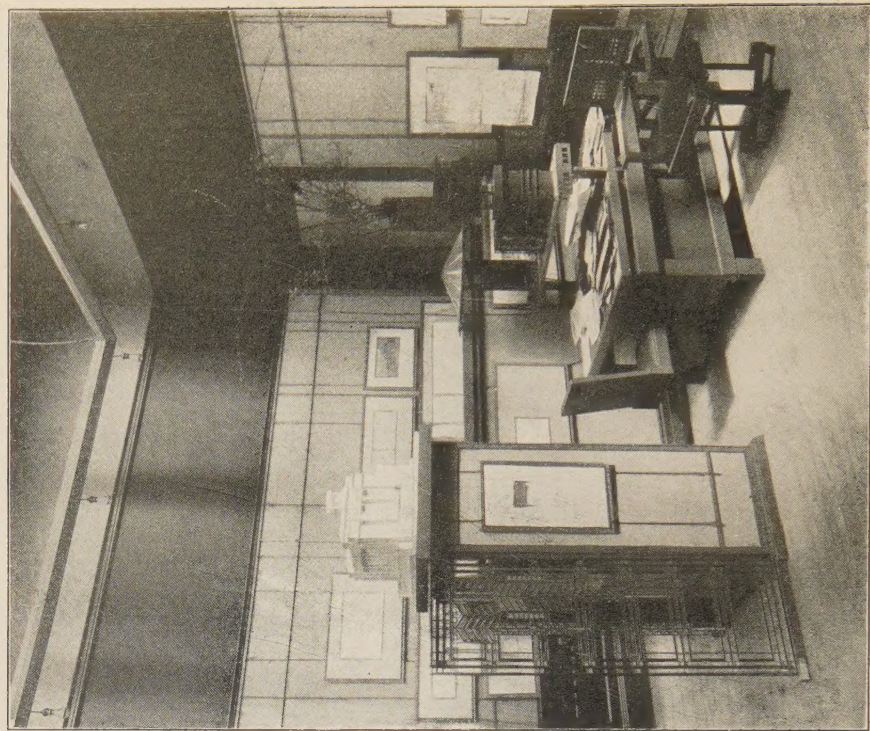
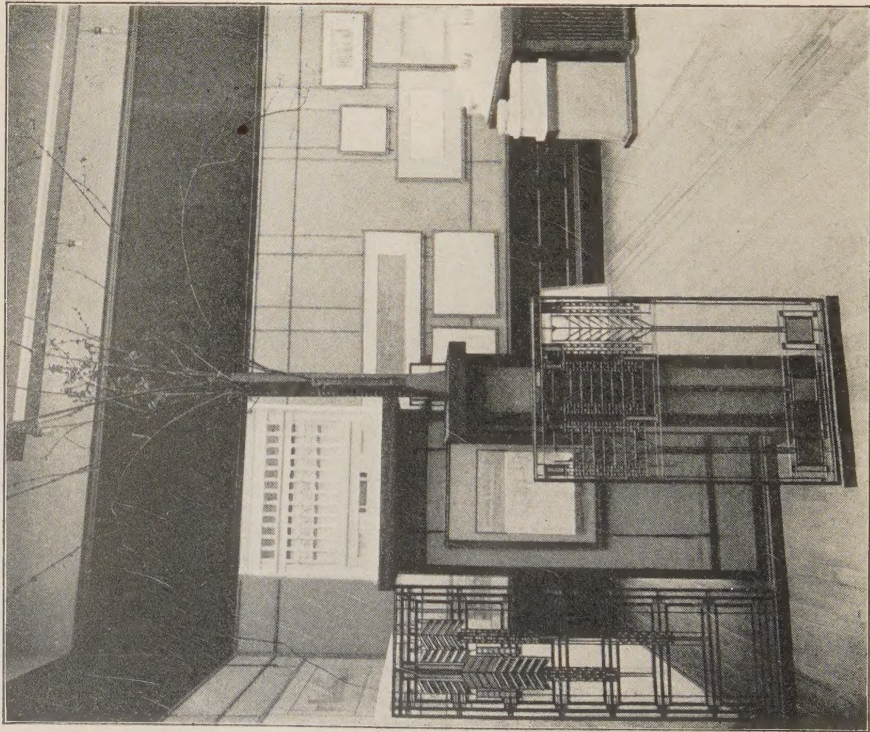


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1912

To
Joseph Hickey
From
Clarke, Howe & Homer Architects
Christmas 1912



CHICAGO ARCHITECTURAL CLUB EXHIBITION, SPRING OF 1907.
Exhibit of Frank Lloyd Wright, Architect, Oak Park, Ill.

Col. Joseph A. Hickey

Architectural Drawing and Lettering

A Manual of

PRACTICAL INSTRUCTION IN THE ART OF DRAFTING AND LETTERING FOR
ARCHITECTURAL PURPOSES, INCLUDING THE PRINCIPLES
OF SHADING AND RENDERING, AND PRAC-
TICAL EXERCISES IN DESIGN

PART I—ARCHITECTURAL DRAWING

By FRANK A. BOURNE, S.M., A.A.I.A.

Architect, Special Librarian, Department of Fine Arts,
Public Library, Boston, Mass.

and

H. V. VON HOLST, A.B., S.B.

Architect, Chicago, Ill.

PART II—ARCHITECTURAL LETTERING

By FRANK CHOUTEAU BROWN

Architect, Boston, Mass. Author of "Letters and Lettering."

I L L U S T R A T E D

CHICAGO
AMERICAN SCHOOL OF CORRESPONDENCE
1910

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Foreword



IN recent years, such marvelous advances have been made in the engineering and scientific fields, and so rapid has been the evolution of mechanical and constructive processes and methods, that a distinct need has been created for a series of *practical working guides*, of convenient size and low cost, embodying the accumulated results of experience and the most approved modern practice along a great variety of lines. To fill this acknowledged need, is the special purpose of the series of handbooks to which this volume belongs.

¶ In the preparation of this series, it has been the aim of the publishers to lay special stress on the *practical* side of each subject, as distinguished from mere theoretical or academic discussion. Each volume is written by a well-known expert of acknowledged authority in his special line, and is based on a most careful study of practical needs and up-to-date methods as developed under the conditions of actual practice in the field, the shop, the mill, the power house, the drafting room, the engine room, etc.

¶ These volumes are especially adapted for purposes of self-instruction and home study. The utmost care has been used to bring the treatment of each subject within the range of the com-

mon understanding, so that the work will appeal not only to the technically trained expert, but also to the beginner and the self-taught practical man who wishes to keep abreast of modern progress. The language is simple and clear; heavy technical terms and the formulæ of the higher mathematics have been avoided, yet without sacrificing any of the requirements of practical instruction; the arrangement of matter is such as to carry the reader along by easy steps to complete mastery of each subject; frequent examples for practice are given, to enable the reader to test his knowledge and make it a permanent possession; and the illustrations are selected with the greatest care to supplement and make clear the references in the text.

¶ The method adopted in the preparation of these volumes is that which the American School of Correspondence has developed and employed so successfully for many years. It is not an experiment, but has stood the severest of all tests—that of practical use—which has demonstrated it to be the best method yet devised for the education of the busy working man.

¶ For purposes of ready reference and timely information when needed, it is believed that this series of handbooks will be found to meet every requirement.



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FRAGMENTS FROM ROMAN TEMPLE AT CORI, ITALY.

One of the most interesting examples of architectural rendering in existence.

Original drawing by Emanuel Brune.

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ARCHITECTURAL DRAWING.

PART I.

Instruments and Materials. The study of mechanical drawing has acquainted the student with the use of the ordinary drawing instruments and materials. Those required for architectural work are substantially the same.

Pencils. Soft pencils are used; a draftsman cannot have advanced far in ability before becoming familiar with the B B pencil, which will draw any line, from the finest to the coarsest, and give the greatest freedom for all kinds of work, from sketching to full-size details.

In architects' offices it is an almost invariable rule for the new-fledged student and young draftsman to use hard pencils—"nails," as they are called by more experienced men. A soft pencil gives a much more agreeable expression of ideas on paper than a hard pencil; the latter should be reserved for mechanical work. The draftsman must not allow himself to become less accurate as he gains greater freedom, and the use of a soft pencil gives no excuse for a careless or slovenly drawing. H H, F and B B will be found the most useful grades. For laying out work, H H is often used.

Erasers. The noted architect, H. H. Richardson, said that "an eraser is a draftsman's best friend." For work on detail paper, a firm rubber is best, but a soft rubber is most serviceable for removing ordinary pencil marks from all kinds of paper, including the thin tracing papers, without injury to the surface. It will be found that the eraser can be frequently used in studying outlines, and it is the custom for rapid draftsmen to let the pencil lines run where they will, trusting to the eraser to make the outline true. A large size ink eraser will be found easier on the hands than a small one. In making erasures a typewriter's shield of metal with different sizes

For some of the text and several of the illustrations in ARCHITECTURAL DRAWING the French work, *Éléments et Théorie de l'Architecture*, Vol. I., by Guadet, has been drawn on freely. The four volumes of this work by Guadet cannot be too highly recommended. Even those not familiar with the French language will find it an excellent reference work on account of the numerous useful illustrations it contains.

of openings, corresponding to the erasures to be made, called in draftsman's parlance, the "office goat," is useful. Holes can be cut in cardboard or detail paper for this purpose.

Set of Instruments. Good instruments are advisable, as it is hard enough to make good drawings, even with the best. Compasses with pencil and pen points and extension legs; large and small dividers, bow-pen and bow-pencil, and two ruling pens, form the usual equipment of the architectural draftsman's instrument case. Besides these a simple form of proportional dividers will be found very useful, especially in changing drawings from one scale to another, and also when it is desired to translate a rough sketch into a definite scale, preserving the proportions of the sketch. A small protractor will be sufficient for the rare occasions when an architect lays off angles to a given number of degrees.

Beam compasses are useful, though many offices have only long straight edges and carpenters' clamps for this purpose. Sometimes a taut string will serve the purpose where perfect accuracy is not required, or two points on a straight edge may be taken, one point being held with one hand, while a curve is struck from another point by a pencil held in the other hand.

Drawing Boards. It is necessary to have two drawing boards, one a "Double Elephant" size, 28×42 inches, to accommodate paper of a size called "Double Elephant," which is 27×40 inches, thus allowing $\frac{1}{2}$ inch at the sides and an inch at the ends; the other board 23×32 inches, to accommodate the size of paper called "Imperial," which is 22×30 inches. It will be found convenient also to have a small "Half Imperial" board 23×16 inches in size. These boards should have a straight grained cleat at each end, or should be entirely surrounded with a framework of hard wood, having soft wood in the center. Cherry makes a good hard wood for the frames or ends, and pine or white wood for center. In many offices the boards are made entirely of pine or white wood, but it will be found preferable to have better made boards, and to take good care of them, keeping them square. If adjacent sides of the board make a true right-angle, the T-square can be used on these two sides, which is an advantage in drawing long lines. When the boards have cleats at the ends only, however, it is always necessary to use the T-square from the left-hand end only.

Triangles and T-Squares. There are T-squares to correspond to the size of the boards. They are usually made of straight, fine grained hard wood. The simplest form of fixed T-square will be found the most satisfactory for general office use. As even the best are apt to vary, it is a good idea to number every T-square in the office and note the number on commencing a drawing. If, however, the T-square is changed, and the new square does not line up with the old work, a thumb tack in the edge of the head next the drawing board may be used to bring the blade into line, as shown in Fig. 1. The drawing edge (upper edge) of a T-square should never be used as a straight edge for paper cutting.

Two triangles are required, one 30 degrees to 60 degrees, and one of 45 degrees. Triangles are made of wood, hard rubber or celluloid.

Materials for Wash-Drawings. For tinting, a nest of tinting saucers, brushes, a soft sponge, large blotters, a stick of India ink, a slate slab for grinding it, a half cake of carmine and a half tube of Prussian blue will make a good beginning.

Paper. Paper comes in certain conventional sizes.

"Whatman's paper" is most easily obtained in two sizes, the "Imperial," 22 × 30 inches,

and "Double Elephant," 27 × 40 inches, and is a useful paper for all-around architectural work, being good for pencilling, inking in, and wash drawings; colors can be laid on it even after erasures have been made. The Whatman "hot-pressed" paper has a smooth surface and is generally used for fine pencil or ink drawings. The Whatman "cold-pressed" paper has a rough surface and good texture, and is useful for all-around work.

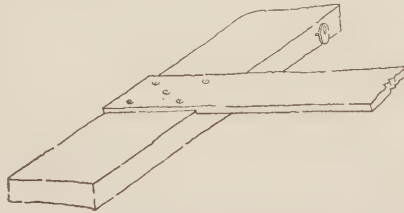


Fig. 1. T-Square with Thumb Tack.

Tinted Papers. Gray or other colored papers are frequently employed, pencil or pen and ink being used for the lines and shadows, and chalk or Chinese white for the high lights. Pastels and water colors are used on special colored papers; "scratch papers" are those on which white is obtained by scratching through the colored surface of the paper. Some of these papers, including buff or manila detail paper, have already been fully described under the subject of mechan-

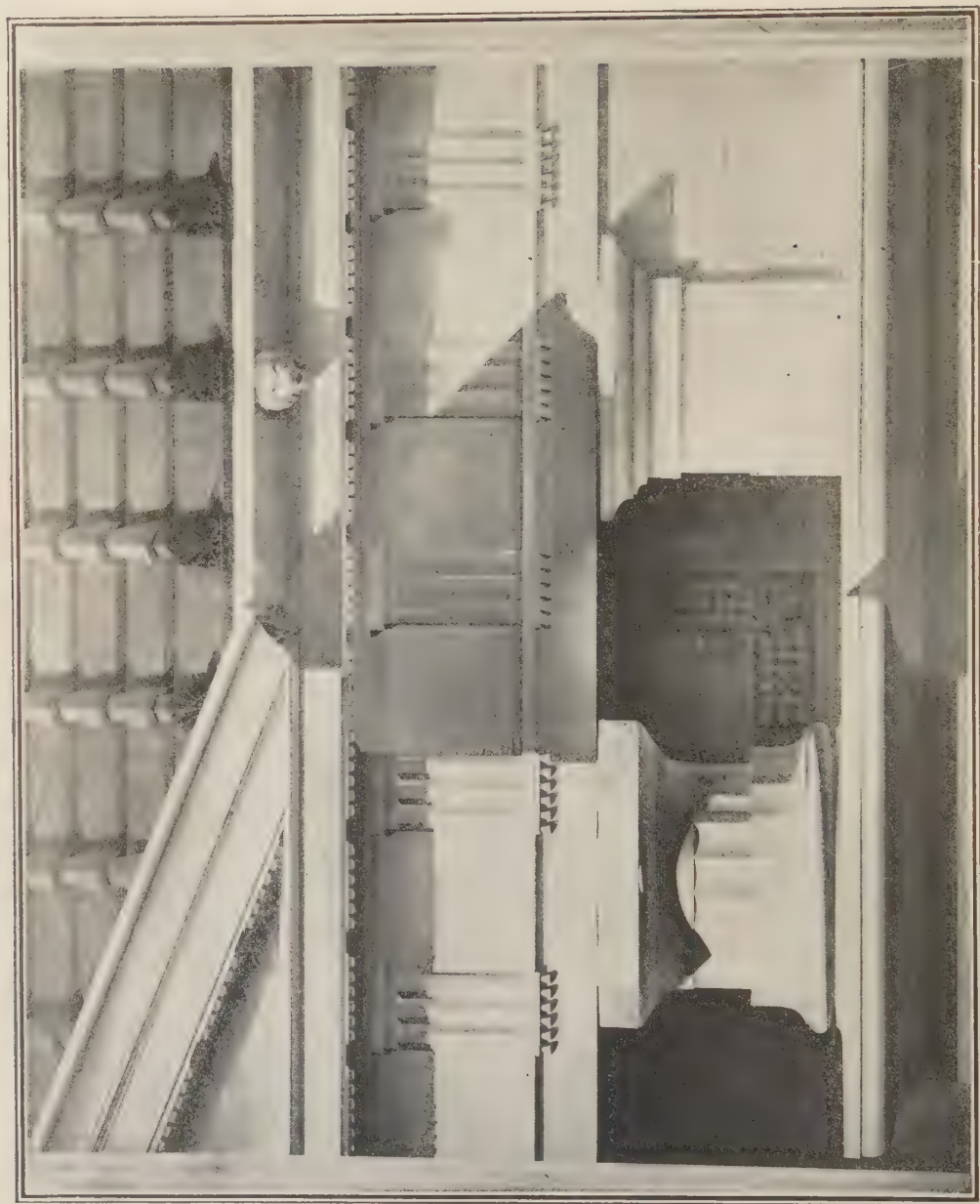
ical drawing. The process of stretching paper is also there described.

Tracing Paper. In architectural work a great deal of tracing paper is used. A cheap manila tracing paper is convenient for rough preliminary studies not intended to be preserved. "Alba," a white tough tracing paper, and "Economy," a cheaper form, are very good for pencil sketching and also for careful pencil drawings. Rowney's English tracing paper is very transparent, is good for accurate pencilling, and takes color, but becomes brittle with age; it is, however, the best paper for careful studies of architectural work. Bond paper which comes in sheets 20×28 inches, is very useful for working drawings of small frame houses, as the drawing can be inked-in and blue prints taken directly from this paper without the necessity of tracing.

Some offices make many of their details in black pencil on this paper and where work on different houses is similar, let blue prints of these details serve for each new building.

Tracing Cloth. Tracing cloth is used for important work where the tracing will be roughly used or where changes are likely to be made in the drawing. In drawing on tracing cloth, there are three ways of making the ink flow well: (1) The most common is to rub powdered chalk over the surface, dusting off the superfluous chalk; (2) Benzine applied with a towel will clean the cloth; (3) Osgall, a preparation obtainable at any artists' materials store, may be mixed with the ink. Sometimes pencil drawings are made directly on the cloth, and after inking-in benzine is used to remove all pencil marks. As a rule, the rough side of the tracing cloth is used, but some draftsmen prefer to ink-in on the smooth side, thinking they can make a cleaner line, and then turn the cloth over to color the drawing on the rough side with water colors or crayons.

Scales. Scales for architectural work are like those used for mechanical drawing, one-quarter inch to the foot for working drawings, and three-quarter inch to the foot for details, being the customary scales used in American offices, though some offices use one-eighth inch to the foot, with one-half inch to the foot for details—the custom usually followed in England. It is customary to make full-size details of mouldings and of special constructive parts. Three-sixteenths inch to the foot is sometimes useful as a scale drawing, or



DETAIL OF GREEK DORIC ORDER.

An example of conventional shadows and rendering.

in laying out stairs in section, as will be described later. This scale is also frequently used for exhibition drawings. One and one-half inch to the foot, one inch to the foot, and three inches to the foot, are also used. For the scale of three inches to the foot, the ordinary quarter-inch scale may be read as inches instead of feet, as one-quarter inch is one-twelfth of three inches. The three-quarter inch scale is the favorite among carpenters for the reason that the ordinary two-foot rule can be used on the drawings; as there are twelve-sixteenths of an inch in every three-quarters of an inch, each sixteenth of an inch on the rule represents one inch actual measurement. The inch scale is very popular for drawing mantels, interior finish, etc., where the total dimensions can be read directly from the two-foot rule, each inch being equal to the foot full size.

The accompanying illustration of an architect's scale, Fig. 2, shows the usual divisions on a scale for ordinary architectural work.

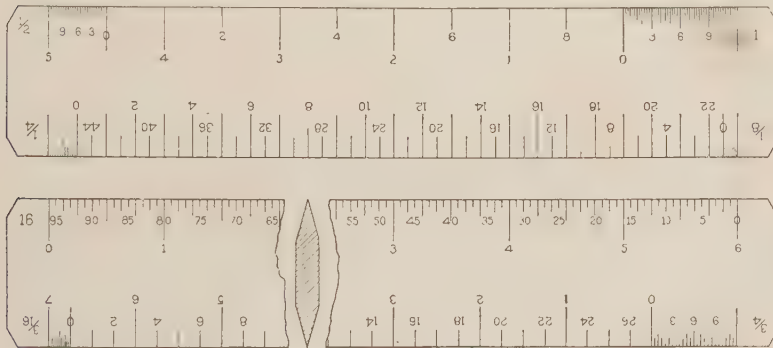


Fig. 2. Architects' Scale.

A six-inch scale of this size is very convenient for ordinary measurements and a similar one eighteen inches or two feet long is useful for laying out larger work. This scale gives the full-size measurements in inches divided into sixteenths with the scales of sixteenths reading in the reverse order from zero up, so that the number can be read directly from a sixteenth scale or doubled for a thirty-second inch scale. The common quarter-inch and eighth-inch scales are given, as well as the half-inch and one-inch scales. The useful three-quarter inch scale is given with the three-sixteenths scale in reverse order.

The accompanying sketch, Fig. 3, shows how a scale may be used in laying out staircases in plan and section much more rapidly

than is usual in architects' offices. The sketch shows the plan and section of a staircase at a scale of one-quarter of an inch to the foot, the staircase to be three feet six inches wide. The section shows that the floors are nine feet six inches between finished surfaces. As it is desirable to economize space, the stairs are to be laid out with about seven and one-half inches rise and eleven inches tread. Dividing nine feet six inches by seven and one-half, we find that fifteen

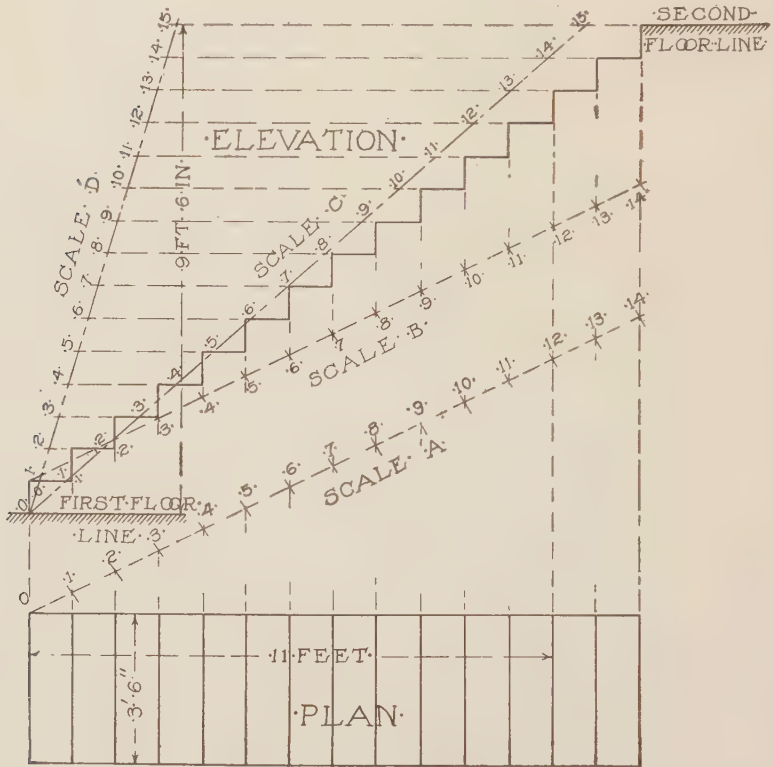


Fig. 3. Use of Scales in Laying out Stairs.

risers will give us slightly over seven and one-half inches. To lay out fourteen treads—which locate the fifteen risers including the first and last—instead of spacing over fourteen treads, start from the first riser, lay off parallel to run of stairs in plan eleven feet on the quarter-inch scale; then draw a line perpendicular to the run of the stairs. Tip the scale until the zero coincides with the first tread and twelve

coincides with the line just drawn. Each division of the quarter scale marked off as a scale of proportional parts will give us a series of points through which we can draw parallel lines which will locate the risers eleven inches apart. If it is found that the stairs do not arrive at the point desired, the scale can be tipped more or less and each tread decreased or increased. The same method can be followed for laying out the stairs in elevation.

LINE DRAWING.

Character of Line. The thickness of the line in drawing should be the same throughout its length, except occasionally in perspective rendering. The line may vary in different parts of the same drawing, and in different drawings, according to how much or how little detail is to be shown, but in every case the lines should be firm and clear. Those parts of an elevation which are nearest to the spectator should be drawn in heavier lines than the more distant parts. Thick lines generally tend to simplify the design. The outline of the curved mouldings, excepting those circular in section, should be drawn freehand, as they can be given more character in that way than if made with the compass.

The compass should be used in such a way that the point will not make large holes in the paper. The arms of the compass should be bent so that the pencil point and needle point will be perpendicular to the paper. Pencil lines should be made without a heavy pressure so as not to dent the paper. The ruling pen should be held like the pencil and used very lightly, for if too much weight is put upon the pen, the paper will be cut, and if the pen is pressed too hard against the T-square the blades of the pen will be closed and the lines become weaker. It is also necessary that the ink should always flow freely from the drawing pen. It should be renewed frequently and the pen should be cleaned each time it is refilled. If the ink refuses to flow, it frequently can be started by touching the end of the pen to the moistened finger, capillary attraction immediately starting the ink to flow.

Ordinary writing ink should not be used with the drawing pen. After the drawing is inked in, the pencil lines can be erased. The student will eventually become accustomed to making the important lines with the pencil and putting in many of the lines of the drawing

immediately in ink, between limiting lines in pencil. But the draftsman should be very sure of himself and his drawing before using this method.

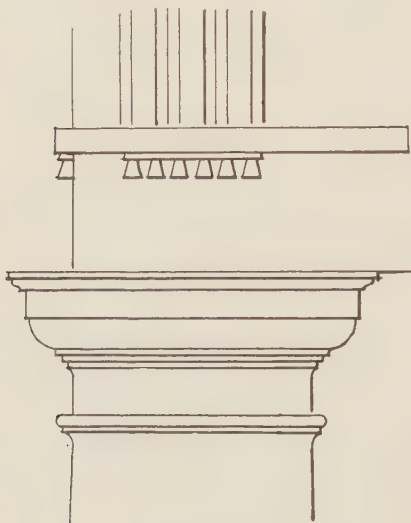


Fig. 4. Shade Lines.

certain points, and by carrying through only certain important lines of mouldings, and drawing other lines only a short distance. Finished lines coming down on to projecting surfaces may be stopped short just before reaching the surface, giving effect of high light on those surfaces, as shown in Fig. 4; and lines at outer angles may be carried slightly across each other, giving a firm intersection, instead of stopping just at the junction. For plans the same holds good, as is shown in Fig. 5.

In an elevation, the planes toward the front may be drawn with dark lines and those farther back with lighter lines. Joint lines in masonry and the lighter lines of carving should be drawn in ink which has been diluted with water. The design for the National Maine Monument, page 9, shows a good method of lining an architectural drawing.

Shade lining, or indicating shadows by making the lower and right-hand edges of projecting planes in elevation heavier, see Fig. 4, is used in architectural drawing, especially in illustrations for publication. In office work, when it is desired to show the shadows, the latter are generally laid in washes. The brilliancy of the architectural drawing shown in many recent examples, especially from New York offices, is much increased by strengthening the outline of projecting members and ornamental parts, by accenting certain

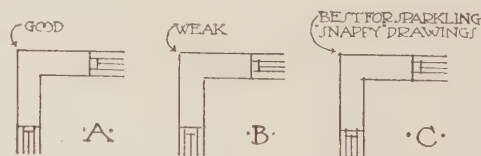
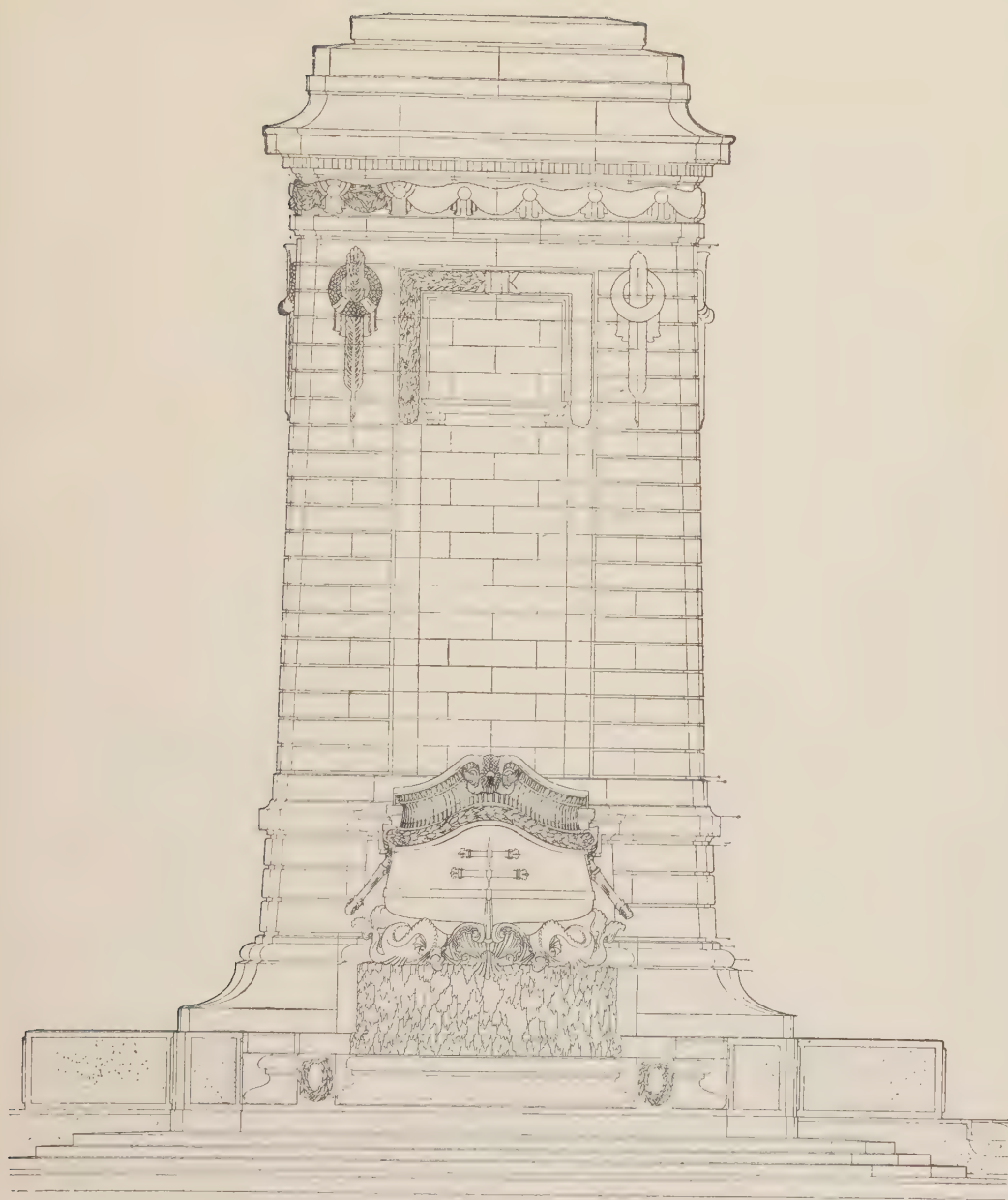


Fig. 5. Junctions of Lines.



First Prize Design. National Maine Monument.

H. Van Buren Magonigle, Architect.

Sometimes lines of different colors, as red to indicate brick, blue for stone, yellow for wood, etc., are used on working drawings to take the place of tinting.

DEFINITIONS.

Architectural drawing is geometric. If the student is making the drawing of a model, he should try to think how the author of the model laid it out, and how he, the student, would proceed if he had the opportunity to lay it out. He will find that the model is represented on paper by the different projections such as the plans, sections and elevations. These are laid out to a certain scale; that is to say, one-fourth inch to the foot, which means that one-fourth inch in the drawing represents one foot in the model; or one-eighth inch to the foot, etc.

Definition of Plan. A plan of a building is a section cut by a horizontal plane through the walls, supports, etc., at such a height so as to show the greatest number of peculiarities in construction, walls, doors, windows, supports, columns and pilasters, fireplaces, etc. It is possible to consider a plan as a horizontal impression that could be taken of the building in course of construction when it had arrived at a certain level in the height of a story. On the plan the construction is shown invariably by horizontal sections, but it is possible to project up all that is below and also to show what is above. In the first case the plan will show the architectural portions which project beyond the base of the walls or supports such as the base, steps, approaches, etc. In the other case it will show vaultings, ceilings, entablatures, cornices, etc. Sometimes it is desirable to show both—half of each—provided the parts shown are sufficiently interesting or necessary for explaining the entire scheme.

Definition of Section. The section is a plane cut through a building vertically, that is to say, it is the same thing perpendicularly that the plan is horizontally. This plane should be taken along the line of some main axis.

A single section rarely is sufficient to give all the interior of the building. It is necessary to have, as a rule, at least two, one a longitudinal section, perpendicular as a rule to the facade, and the other a transverse section, usually parallel to the facade. Very often a

small section of the front alone is made. This should preferably be called a profile of the front.

Definition of Elevations. The elevations of a building are the projections of the building on vertical planes parallel to the side of the building of which an elevation is desired. Except in the case of complete uniformity, it is necessary to have several elevations in order to show the complete exterior of a building, such as the principal facade, side elevations, and rear elevation.

THE IMPORTANCE OF AXES IN ARCHITECTURAL DRAWING.

The axis is the key of a design or of any composition. An axis in geometry is a line which separates into two equal parts any symmetrical plane figure, or the pole of a surface of revolution or of a regular solid, such as a rectangular prism with a regular base. In architecture the idea of the axis is greater than this. It is in reality a vertical plane through the whole building separating the building into two parts symmetrically, or in such a way that they balance one another.

Although the graphical representation is confined to a straight line, do not forget that it is not simply a line. Take for example a church; in drawing the plan, the axis of this plan will be a straight line separating it into two parts, but this line itself will be only the projection of the central vertical plane which is the axis of the whole building; and the keystones of the vault, the lights which drop from them, the center of the rose window, etc., are *in the axis* of the church. Notice besides this that the straight line which is the axis of the plan, and the line which is the axis of the front and rear facade, the line which is the axis of the transverse section—these lines are only the traces, all belonging to some axis plane, as it may be called, and this plane is the principal axis.

But there are other minor axes. Parallel to the main axis are the axes of the side arms and between these are the axes of the columns. Running transversely are the axes of the transept, those of each bay, the radiating axes of the chapels, etc.

In laying out the drawings of a church, for example, first place all of these different axes with the utmost accuracy. This method of laying out the drawings of a building by starting with the axes may

be best explained by examples. Let us commence by the study of a plan, that of a vestibule, in a public building; *e.g.*, the Hotel des Monnaies at Paris, Fig. 6.

After having drawn the axis 1, which is the principal axis of the building, it will be noticed that there are five bays of the central pavilion which are spaced equally. Of these draw first the extreme axes, 2 2; by dividing the space between axes 1 and 2 into equal parts, the intermediate axes 3 3, will be found. In this way the chances of error would be decreased, for if the axes were placed in the order 1, 3, 2, the possible error would be doubled. Now taking the portion to the right, draw first the extreme axis 4, then 5, and divide the space 4 5 into equal parts, which will give the axis 6.

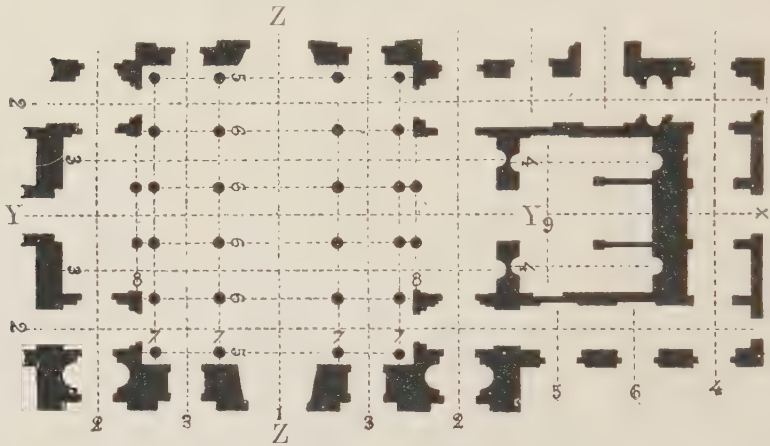
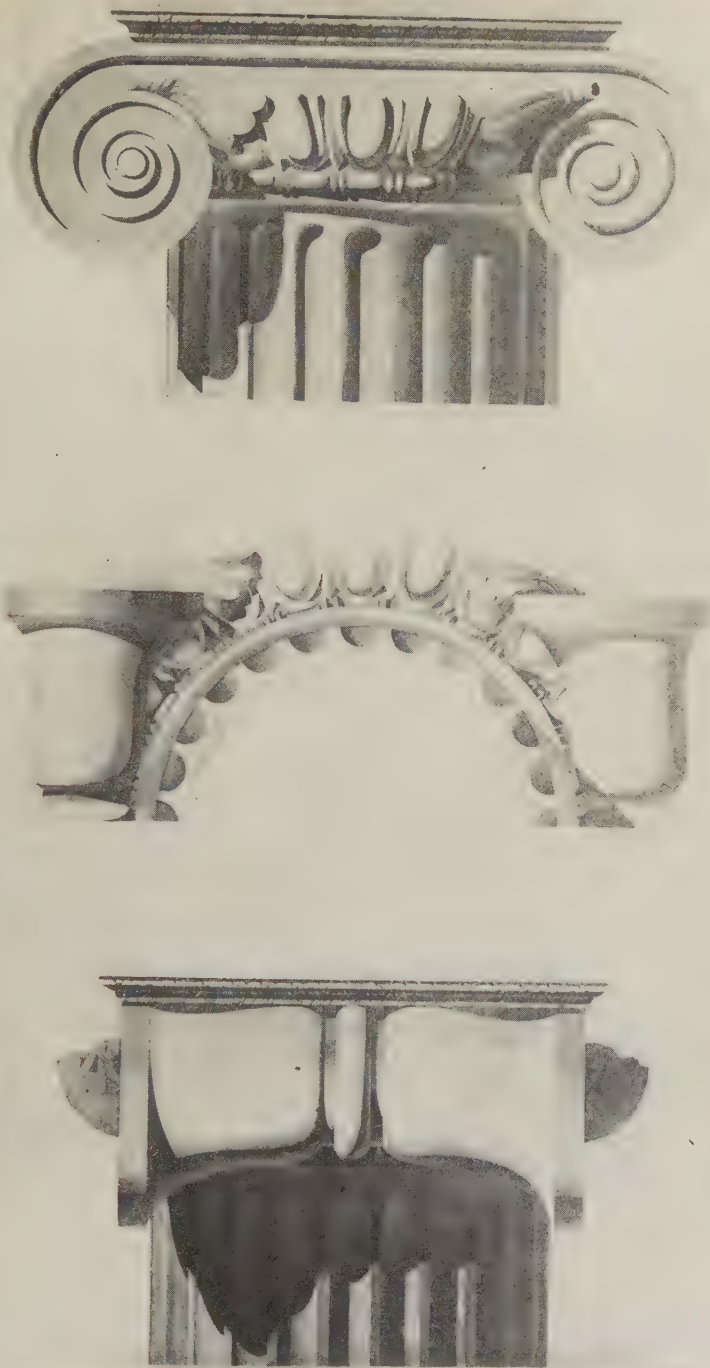


Fig. 6. Plan of Vestibule of Hotel des Monnaies.

Now consider the axes of the rows of columns 7 7. These are to be arranged in relation to the axes 3 3; finally the axes 8 8 are located in relation to the extreme axes 7 7, being checked in relation to the axes 2 2.

In the longitudinal direction the same process will be gone through, placing the first axis 1, then the extremes 2 2; by division 3 3 will be obtained, and dividing the spaces between the axes 1, 2, and 3, into half, the axes 5 and 6 of the columns are obtained. The secondary axes will be placed in the same way. Finally it will be found advisable to check up the different steps by verifying the distances of the secondary symmetrical axes from the central main axis.



RENDERING OF ROMAN IONIC CAPITAL.

Showing conventional shadows and reflected lights and shadows,

Reproduced by permission of Columbia University.

In carefully studying the plan, and the different methods of drawing it, the student will become convinced that the methods of spacing the axes are of great importance, and that in this way he will arrive at exactness and will avoid many mistakes.

The student must understand that it is much more difficult to draw a good plan than is popularly supposed; more difficult, perhaps, than anything else, from the mere fact that everything builds up from the plan. In the plan especially, extreme exactness is necessary

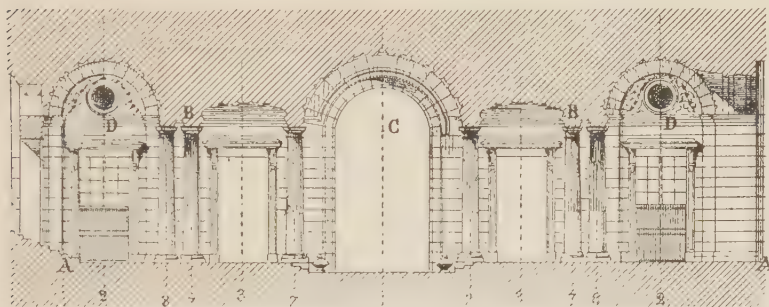


Fig. 7. Hotel des Monnales, Transverse Section of Vestibule.
Section on YY.

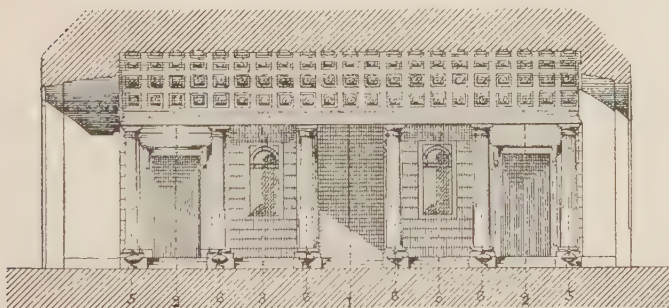


Fig. 8. Hotel des Monnales, Longitudinal Section of Vestibule.
Section on ZZ.

and the student will do well, in order to become familiar with architectural drawing, to practice the drawing of plans constantly.

Now let us consider the sections, taking the same example that we have just considered. The student will easily see that the architect cannot study his composition thoroughly without the aid of numerous sections. Two sections, however, are especially necessary, those following the principal transverse and longitudinal axes of

symmetry. If the student wishes to draw both of them, he should decide first which one of the two controls the other. See Figs. 7 and 8. He will see that in this case it is the transverse section, parallel to the front elevation. The other, the longitudinal section, is chiefly the projection of elements of the other section. Therefore, in this case the drawing should be commenced by laying out the transverse section.

First, place the axes just as has been done in the plan, 1, 2 2, 3 3, 7 7, 8 8. In regard to the profiles or the parts in section, the first thing necessary is to locate the heights of the essential parts, taking for the first level the main floor A A, next drawing the upper line of the capitals of the columns B B, then the centers of the vaults C D.

Starting with these principal lines, draw in the details, as for example, the heights of the bases in relation to the floor A A. The capitals and heights of the architraves will be located in relation to the line B B. It is evident that if all the measurements were taken from the level of the main floor A A, the least inexactness would affect the capitals, while if the total height of the column A B is once determined, no mistake can be made in the height of the base and that of the capital, and even admitting a slight inexactness, it will be inappreciable on the total height of the shaft of the column.

In all which has preceded, the drawing has been laid out along the lines of the axes. But besides these are some conventional methods by which the drawing of profiles in section or in elevation can be facilitated. Let us take for example a fragment of the Doric order—one from the Parthenon, Fig. 9. To reproduce this drawing one should measure the different projections by referring them to one single vertical line. In this case the axis of the column would not furnish a convenient axis for measurement, as with exception of the column, it determines nothing. It is best to proceed just as in measuring an existing order, that is, by dropping a plumb line from the overhanging cornice and measuring the distance from that plumb line to the various members. But this vertical line from the outer member of the cornice will be only useful for laying out the profile and in locating the axis of the column; axes should be drawn in every other possible case. For instance, place the column on the axis A; the triglyphs, on B; the metopes, on C; the head of the lion, on D, etc. To obtain the heights draw the principal divisions in first; the total height of

the capital, the total height of the architrave, the complete frieze, the complete cornice; then draw in each detail in height within these first divisions.

The channels of the triglyphs, the guttae, etc., are all drawn in on their own axes. As for the channels of the column, these can only be drawn by projecting them. Do not copy them from the drawing, but draw out a plan, dividing the circumference into twenty parts or whatever number the design calls for, and project these divisions up to the elevation.

Study the model carefully before copying it; thus, in this example a close examination will show that the architrave is slightly sloping while the frieze is not. If the student has the opportunity to see mouldings similar to those which he is drawing, he should study them carefully. It cannot be too often repeated that architectural drawing should not confine itself to exercise for the hand; there should be the opportunity for real study of whatever is drawn.

Limiting Lines. In geometry, we have learned what the *abscissa* and the *ordinate* are; *i.e.*, the elements of reference by which a point is referred to a system of fixed rectilinear co-ordinate axes. For every part of a design of which the elements are not geometrical lines, such as a right line or circle, the method of abscissa and ordinate is used, as in laying out profiles of mouldings or curved ornaments such as eggs in the egg and dart motive. Take for example a baluster, Fig. 10; it is evident that it should be drawn in relation to its axis. The student will mark the general divisions, A B the die, B C the base, C D the shaft, D E the capital, after which the secondary lines

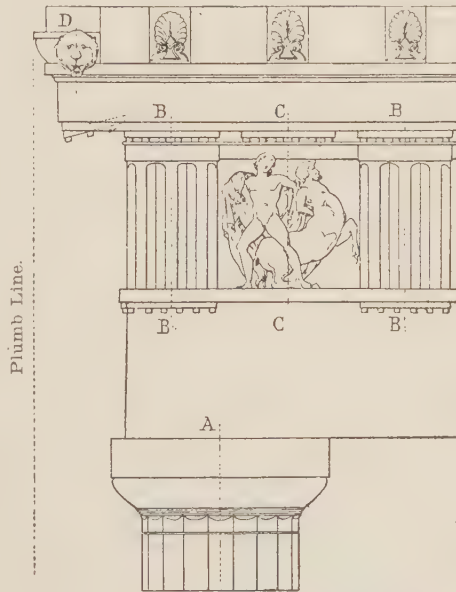


Fig. 9. Capital and Entablature from the Parthenon.

of the mouldings should be drawn in. Between C and D, however, the profile of the shaft may vary very much and the student will not be able to copy it except by laying off horizontal divisions. For that purpose, draw the limiting lines of its greatest width $m m$, mark its point of application M, and repeat this operation on the drawing. In the same manner lay off the line $n n$, and the point N, which gives the smallest diameter of the shaft, and do not mark these points by a single point with the pencil, but be careful to draw the limiting (in this case vertical) lines at every point, and do not erase them until after you have inked in the drawing. These lines will be a safe guide and will enable one to make an exact and clean drawing.

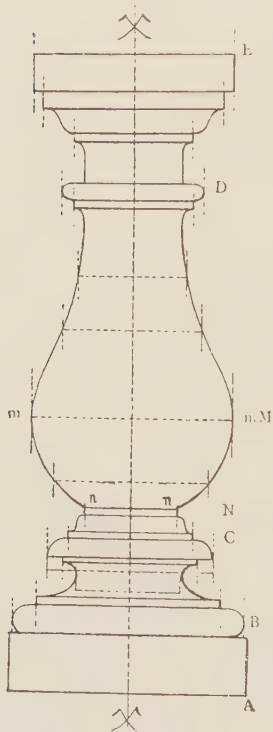


Fig. 10. Baluster.

As another example take the fragment of the cornice with different ornaments, taken from the Temple of Concord, at Rome, Fig. 11. The construction lines marked on the drawing, and which should be kept in pencil until the drawing is completed, show especially well the method previously explained.

Finally, to produce an architectural drawing with precision demands primarily a rational method and methodical habits. The design gains by its facility, but the method can only be a general one. In its application, an intelligent draftsman will recognize each time what should be the logical sequence in carrying out the drawing.

And still, all of this will be only the mechanism of the design; it is necessary to put into it taste and sentiment. For all of this there is only one precept—it is by practice that one becomes a good workman.

Oblique Projections. It happens often that in an elevation or section architectural motives are represented obliquely in relation to the principal plane of projection. Thus in a circular building a series of similar windows are in elevation at different angles, consequently the widths differ, but the heights do not.

It is necessary to become familiar with these conditions of drawing which occur frequently. It is here above all that geometry will be very useful, for that study includes the planes of projection and planes of development.

While there is some little difficulty, there is also much profit to be gained in projecting an architectural motive at an angle. In order to project a motive at an angle correctly, one must understand the motive thoroughly. An architectural arrangement drawn out in direct elevation only, will not tell the whole story, but if drawn in oblique projection a thorough understanding of the arrangement is gained.

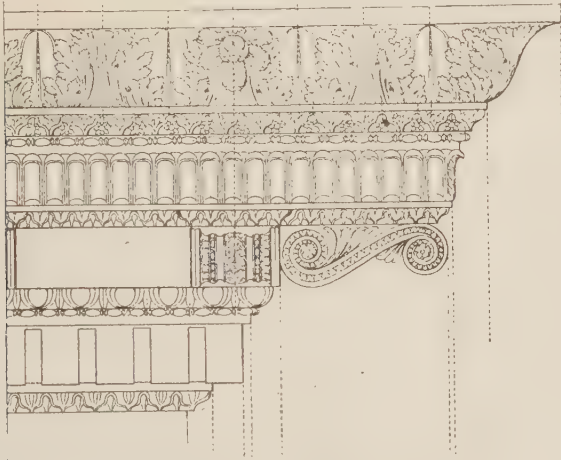


Fig. 11. Entablature from the Temple of Concord, Rome.

It is recommended, therefore, as a very useful exercise to draw out in oblique projections, designs that are made in direct elevation; it is a good exercise in design, but above all it is an excellent preparation for architecture, compelling the designer to analyze his model and to see it *as a whole*; to understand its projections and to comprehend the position of the different details. The designer realizes that he is working on the real building rather than in simple imagination, and so will soon see of how much advantage these exercises will be to him.

Consider, for example, two windows, one in direct elevation and the other projected at an angle. It is evident that the direct eleva-

tion permits the study of proportions and it is evident also that the oblique projection shows more than the direct elevation of the different parts of the window. In the same manner draw out the development of such parts of buildings as vaultings, circular walls, etc.

All this can be summed up thus: Study architectural drawing as an architect. Become accustomed to see in the drawing the object represented. It is very necessary that the drawing should be nothing more for the designer than a sort of language, and that he should see in reality the thing itself, just as a composer of music, as he puts down on paper the notes of his score, can hear them as though they were being played; just as everyone in reading a book of printed characters never notices the printed letters but feels the emotions that are meant to be conveyed as though the words were spoken.

Modeling an Architectural Drawing. A design is only complete when in addition to the outlines, it is modeled, that is to say when the form is expressed. The most common process for modeling an architectural design is by wash drawing, but the methods of modeling are the same whether done by wash drawing or by rendering with the pen, the pencil, or other processes. It is not possible to say that modeling has absolute rules, or that all methods are good even if the desired effect is obtained; *i.e.*, if the reliefs and the forms are represented in their true relations to one another. There are, however, certain general principles that can be used as a guide in modeling a drawing.

Shadows at 45 Degrees. It is the custom to assume that the light rays fall in a direction, the horizontal and vertical projections of which make an angle of 45 degrees with the line of the ground. The luminous ray itself does not make, in reality, an angle of 45 degrees with the planes of projection. Its direction is that of the diagonal of a cube whose faces are respectively parallel and perpendicular to the planes of projection.

This method has two advantages; the laying out is easier, which it is well to consider, for the drawing of shadows is often a long and complicated process, and in this case the depth of the shadows is equal to the projections. Consequently, the size of the shadows permits anyone to understand, without further drawings, the projection of one architectural body in relation to another, and the relative positions in space of the different surfaces in one body.

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DETAIL FROM TEMPLE OF MARS VENGEUR.

An example of classic lettering, conventional shadows and rendering.

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The drawing of shadows is often difficult; it is one of the essential parts of descriptive geometry that will also be found in special treatises. As for indicating shadows which cannot be laid out accurately, such as shadows of decorative parts, it is a matter of judgment to determine the amount of projection—a knowledge gained by experience.

Values. After having drawn the shadows, lay over the shadow part a uniform tint. Now the drawing will be seen to be divided into lights and shadows.

As a first principle, it is necessary always to make a distinction between light and shade; shadows will always be modeled, lights will also always be modeled; but it is necessary to be able to distinguish clearly which is light and which is shade in the same drawing, at least where there are large spaces between different planes. The parts having the darkest tint in the light should remain lighter than the lightest reflected lights of the parts in shadow. Besides this, geometrical design, not being able to make use of the illusions of perspective to show distances and projections, has to make use of expressive modeling, since it is *the values* of the tints alone which will indicate the relative distances and projections.

Therefore, in order to bring forward or to set back one plane with relation to another, the only resource will be to tint them differently. Notice what happens in this respect in nature; for instance, an object placed near the eye is modeled very clearly and one at some distance is modeled much less, and one at a great distance or on the horizon, is only a mass without details. So, the nearer the object is, the more it is modeled and the greater are the differences between the shadows and the lights; on the contrary, the further away it is the more the lights and shadows tend to mingle. In the foreground there will be strong shadows and high lights, in the distance dull shadows and softened lights; between these an intermediate proportion of shadows and lights. Therefore, in facade, the planes farthest away from the eye will have the least modeling, while the nearer the plane is to the eye, the more is the modeling accented.

As stated above, in nature every light and every shade is modeled and graded; the shadows are more noticeably graded than the lights. The reason for this gradation of shadows is the indirect lighting

thrown back on the shaded objects by neighboring lighted objects, and this is called reflected light.

Take for example a cylindrical body like the shaft of a column. It is easy to distinguish on this cylinder cast shadows and shades. The cast shadows are those which result from the interception by another solid, of luminous rays which without it would have lighted the cylinder. Shades result from the absence of light on the part of the cylinder which by its position cannot receive light rays. Naturally shadows are less affected by reflected light than shades. The reflection of light or the throwing back of light which creates the reflected light comes from lighted bodies, which in theory may be considered as secondary sources of rays of light of which the resultant will be in the direction opposite to the light. That is, since the lighting is in a direction of 45 degrees from above down, and conventionally from left to right, the direction of the reflected light is in the direction of a diagonal from the lower right front corner to the upper rear left corner.

This conventional theory is to be followed as the rule for modeling. Commence with the lights, or where the gradations are more easily comprehended. Take a solid of white stone, for example, a sphere. It is easy to comprehend that the strongest lighting will be at the point of intersection of the surface of the sphere with the luminous ray which prolonged will pass through the center. Then, around this pole of light, the angle of the luminous ray with the surface will be diminishing constantly following parallel zones, having the luminous point for the pole, until it becomes tangent to the sphere following a great circle whose luminous point is also the pole and which will be the line separating the shade from the light. In other words, the light will diminish from the pole to this equator.

In the shadow it will be just the opposite; the greatest reflection will be at the other extreme of the ray prolonged to pass through the luminous point and the center of the sphere, the shadow will increase in intensity from the pole of reflected light to the separating circle of shade and light.

But if any body casts a shadow on the lighted part of the sphere, its shadow will be much less affected by reflected light and consequently will be more intense than the shade itself.

From this follow two rules for modeling: (1) A shadow cannot

be cast on a body unless this body is in the light and some other body is casting the shadow; (2) The value of the intensity, *i.e.*, the degree of darkness, of the cast shadow at any point is in direct ratio to the strength of light on that point.

The application of these rules can be illustrated on a geometric body, for example, the capital of a Doric column and its architrave,

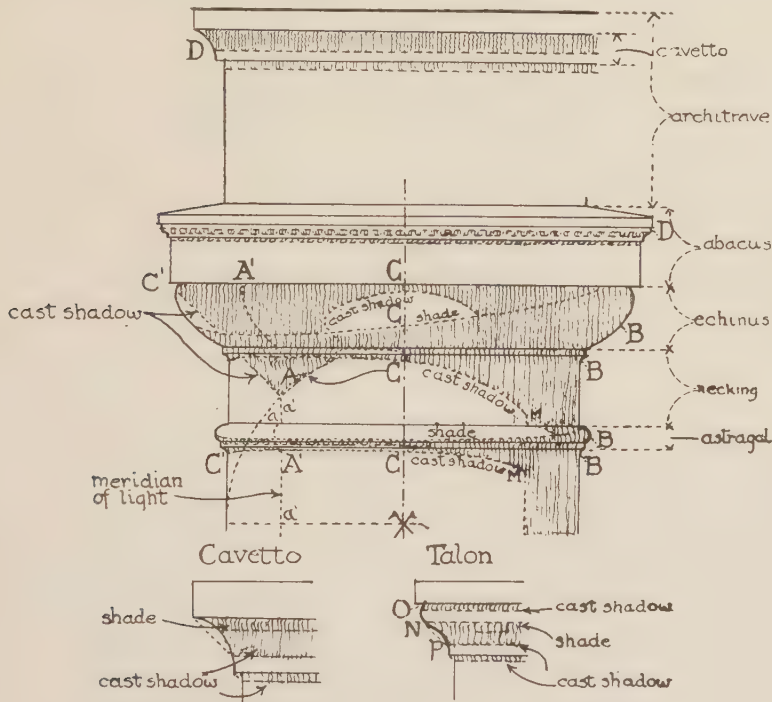


Fig. 12. Shadows on Capital of Doric Column.

Fig. 12. The shadows should be drawn out and a light shadow tint laid over them. Now let us consider where the most intense shadows will be. Evidently at A, where the shadow is determined by a ray normal to the cylindrical surface of a column, and the parts A' A', of the cast shadows which meet the surface of revolution following its meridian of light. The clearest reflected shadows cannot be seen in the drawing as they will be found at the back of the projection on the meridian opposite the point A. But among the parts seen on the drawing the most reflected light will be at the point B B, doubly lighted by its position on plan and by the form of the moulding.

Between these extremes the parts C C will have intermediate values, whether shades themselves or cast shadows. Also, observe that the values of the light at contour C' are symmetrical with the values of the light of contour C. There will be, therefore, a symmetry of modeling, in relation to an axis of the most intense lighting on the column of the luminous part and of the intensity of the shadows; this axis will be on meridian A. As for the mouldings which are straight in plan like D D, their general value will be analogous to the intermediate value C C.

Passing to the lights, we see that the point most lighted will be the point *a*, and finally the generatrix *a' a'*; and the light will become more and more gray up to the tangent M M. But along the astragal the light will extend in almost uniform intensity, for it will strike more normally than on the cylinder. As for the straight parts, the abacus, the architrave and fillets, they will receive less light than the cylinder at *a' a'* and approximately the same as at C C; the sloping part of the abacus will naturally have a more intense light. Otherwise each one of the plain surfaces, in shadow or light, will be graded from the upper part down, because the nearer the surface is to the ground, the more reflected light it receives. For each detail use the same reasoning. Thus, for the cavetto, there is a cast shadow in the lower part, but the portion above the tangent is in shade. The shadow is modelled by continuous grading from darkest at the lower part to the lightest in the upper part; the talon will have cast shadows at O and P, the portions at N being in shade, hence O and P are the darkest parts while N is the lightest.

Another element comes into the modeling; *i.e.*, the openings. An opening is always darker than the simple shadows, for there is almost no reflection that comes in the opening to lighten the shadow. Such are the door and window openings of a facade. The parts in shadow, which are less accessible to the reflections, will be darker than the other parts. For instance, the openings between the dentils, the spaces between the consoles, etc., will be darker than the face of the dentils or consoles and may be as dark as the general shade of the openings. The modeling should be such that the parts which are by themselves in reality, will appear so on the drawing. It is not necessary to exaggerate; the modeling should remain simple.

Lacking good models, it is always easy to get good photographs



CORINTHIAN CAPITAL AND BASE.

Showing conventional shadows and rendering.

Original drawing by Emanuel Brune.

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of good wash drawings; for example, a large number of "Envois de Rome", or drawings made by students in Rome, have been photographed and published. These are models which cannot mislead one.

RENDERING IN WASH.

All studies and completed exhibition drawings in the architectural schools are tinted in India ink or water-color. This is done to show the shadows, and to indicate the relative position of the different planes, and is the method of representation in common use in architects' offices, especially in the presentation of competition drawings.

MATERIALS.

Chinese, Japanese or India inks are used for rendering, on account of their clear quality and rich neutral tone. The ink comes in sticks, Fig. 13, and it is ground in a slate slab provided with a piece of glass for a cover. See Fig. 14.

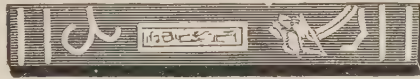


Fig. 13. India Ink.

There are various kinds of brushes. Camel's hair brushes are the cheapest and are useful for rough work. Sable brushes, Fig. 15, are two to three times as expensive as the camel's hair ones on

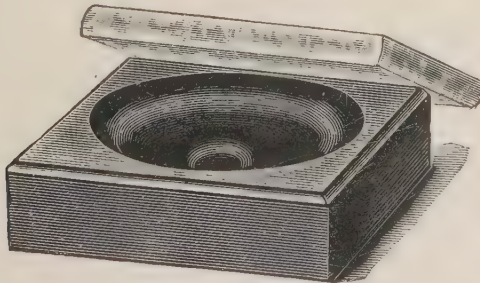


Fig. 14. Ink Slab.

account of the material, but are also very much better. The sable brushes have a spring to them not to be found in the camel's hair brush, and they come to a finer, firmer point. Chinese and

Japanese brushes are used a good deal of late, as they are cheaper than the sable brushes and have some spring to them. A stippling brush is one with a square end, used mostly in china painting. A bristle brush is a stiff brush used in oil painting; on account of its stiffness it is used for taking out hard edges, as described later on. Fig. 16 shows a nest of porcelain cabinet saucers.



Fig. 15. Sable Brush.

Besides these materials the student should provide himself with a large and a small soft sponge, and large blotters, which will sop up water readily. Whatman's "cold pressed" paper is the best paper to use for rendering in India ink.

METHOD OF PROCEDURE.

Stretching Paper. All drawings on which washes are to be laid should be stretched, as described in the Mechanical Drawing, Part 1.

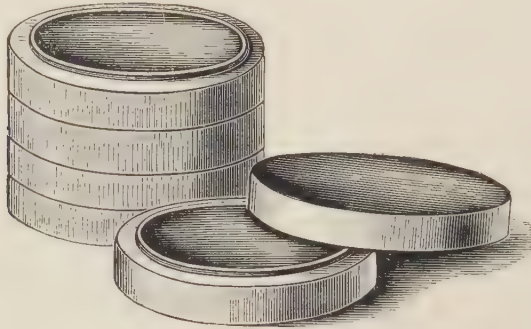


Fig. 16. Nest of Saucers.

Inking the Drawing. The lines should be drawn with ground India ink, the ink being as black as possible without being too thick to flow. Ornament should be inked in with lighter lines than the vertical and horizontal lines. This accents the structural lines. Very often the outline of the ornament is drawn in a heavier line than the remainder. The width of the line

should vary with the scale of the drawing, the larger and bolder the drawing the wider the line.

India ink evaporates very rapidly. It should be kept covered and changed several times a day, especially in summer. After the drawing is inked it should be washed to remove the surplus ink, otherwise when the tint is applied the ink will spread. This is best done by placing it under a faucet and rubbing it *very* lightly with a soft sponge. If the inking has been properly done the lines will now have the appearance of a firm pencil line of a soft neutral color forming a harmonious background for the tint. The shadows should then be cast and drawn in with a hard pencil in *faint* lines.

Preparing the Tint. For large washes India ink should be freshly ground in a clean saucer each time it is required. In no case use the prepared India ink which comes in bottles, as this is full of sediment which settles out in streaks on the drawing. Always use the stick ink.

Rub the ink in the saucer until it is *very* black; then let it stand, keeping the saucer covered. This allows the sediment, which is so fatal to a clear wash, to settle. After it has settled take the ink from the top with a brush without disturbing the bottom. Put this ink into another saucer and dilute it with the necessary amount of water. Never use the ink in the saucer in which it was originally ground. In dipping the brush into the second saucer it is well to take this ink also from the surface and thus avoid stirring any sediment which may still remain in the ink. In other words, the sediment which is found in even the most carefully ground ink should never be used for washes, otherwise streaks and spots may show in the washes.

Where only a small surface is to be rendered the tint can be mixed on a piece of paper in the same manner in which it is mixed in the saucer. Thus various shades can be obtained more quickly and experiments made more easily. Skill in laying washes is only acquired by practice. However, some instruction is necessary. If, after all possible care has been taken during the drawing, such as placing paper under the hand to keep the paper from getting greasy and keeping the drawing covered to protect it from the dust, the paper has nevertheless become soiled, it should be

cleaned by giving it a light sponging with a very soft sponge and perfectly clean water. Touch the surface lightly, sop on the water liberally, and dry it off immediately with a sponge or blotter *without rubbing*. Before washing, the paper should be cleaned by rubbing it *very* lightly with a soft rubber. Especial care must be taken not to injure the surface of the paper by rubbing too hard.

It may seem that all this care is unnecessary, but it is only by observing this extreme care that the skilled draftsman obtains the transparent wash and the beautiful, even, clear tints free from all streaks, which give so much charm to an India ink rendering.

Handling the Brush. Skill in handling the brush is acquired only by constant practice. The brush demands great lightness of hand. The right arm should never support the body. The arm should not rest on the drawing; only the little finger of the right hand should come in contact with the paper. The brush should be held somewhat like a pencil between the thumb and index finger, and the little finger should be very free in its movements. Touch the paper only with the point of the brush.

The brush should be well filled with the tint and care should be taken that there is practically the same amount of tint in the brush at all times. If this is not done, for example, if the brush is allowed to get too dry, one part of the wash will dry faster than the other and streaks will result.

If the brush should be too wet, the surplus moisture can be removed by touching it to blotting paper.

If the paper is too wet the surplus tint can be removed by drying the brush on blotting paper and applying it to the surplus tint which will then be rapidly absorbed by the brush. Great care must be taken not to remove too much of the tint; otherwise it will dry too fast and leave a streak.

Laying Washes. There are two kinds of washes; the clear washes used in rendering shadows, window openings, etc., and the washes in which the color is allowed to settle, the latter being used to render the grounds surrounding a building. When laying clear washes it is better to tip the board slightly so that the washes may flow slowly in the direction in which they are being carried. If the board is placed flat there is danger of the wash running back over the part that is already dry and thus forming a streak.



DORIC DOORWAY FROM ROMAN TEMPLE AT CORI, ITALY.

An example of classic lettering, conventional shadows and rendering.

Reproduced by permission of Massachusetts Institute of Technology.

The edge of the wash should always be kept wet, for if it begins to dry a streak will surely follow. The tint should be carried down evenly across the board, moving the brush rapidly from side to side so that one side does not advance faster than the other. Carry the tint down about an inch at a time, the amount depending upon the size of the brush and of the surface rendered. Always go over the previous half inch at every new advance, taking care not to touch any part that has already dried. In this way the tint will dry gradually, parallel to the work. Carry the sides of the tint forward a little more slowly than the center. This will make the tint run towards the center and help to avoid the lines or streaks due to uneven drying.

The tint should be carried forward in such a way that the paper will be thoroughly and evenly wet. In fact, it is a very good plan to dampen the entire drawing with a soft sponge before beginning to lay a wash. This dampening should be carried well beyond the edges of the drawing so as to prevent the color from spreading to the drier and more absorbent parts of the paper. Always remove the pool of tint which remains at the bottom of a wash in the manner described under "Handling the Brush." If allowed to remain it will dry more slowly than the rest of the drawing and a streak will show.

The drawing board should be left inclined until the wash is dry. Never lay one wash over another before the previous one is absolutely dry.

In laying washes which grade gradually, either from dark to light or light to dark, grade the tint by the addition of water or color each time that an advance is made, and be careful that these additions are such that the change in color is made evenly.

It is very difficult to lay an evenly graded dark tint with one wash only. It is usually better to lay a light flat wash or a light graded wash to serve for a background on which to lay the dark graded wash. By a flat wash is meant a wash which is the same tone or color throughout; that is, a wash that is not graded. See opening in Doric Doorway, Roman Temple, Cori, opposite page.

Water has to be added constantly in grading. Where there is a series of graded washes, as in successive window openings, it is better to have two or three saucers containing tints of different

strength and carry each tint for the same distance in each window so that the gradation of color may be the same. In grading in this way it is necessary to carry each new wash well back over the old one so the point where one tint ends and another begins may not show.

Sometimes gradations are obtained by laying successive flat washes, each wash beginning a little lower than the previous one. In this way the rendered surface will begin with one flat tint and end with a number of tints, one on top of the other. This is called the French method and is done by drawing *very* faint parallel lines at close intervals to mark the limit of each wash. A very light wash is then put over the whole surface, and this is followed with successive washes, each starting from the next lower line. This method is especially good for rendering narrow, long, horizontal graded washes. See rendering of mouldings in classical cornice opposite. Note particularly the application of this method on the crown moulding, and practically all the curved mouldings.

Avoid laying too many washes in the same place, as the continuous wetting and rubbing which the paper gets from the brush is liable to injure the surface.

If the tints are too dark, a soft sponge can be used to lighten them or to take out hard or dark border lines; but a large brush about two inches wide is still better for this purpose. If it is necessary to use a sponge, use it with a great deal of water, rub *very* lightly and *very* patiently. The water should be kept *very* clean, and the surrounding parts should be thoroughly wet before wetting the tinted part, otherwise the tint may spread over the other parts of the drawing. After using the sponge, dry the paper carefully with a clean blotter. Another and better way is to place the whole drawing under the faucet, turn on the water and use the sponge or brush, as already described, on the parts to be lightened.

To make light places darker, use the point of a brush, applying the tint in small dots. Be careful not to begin with too dark a tint. This process is called stippling, and it must be done *very* gradually and *very* carefully.

Do not forget that the first quality of a wash is crispness. It is necessary to draw with the same precision with a brush as with a pencil. When the drawing is finished it should be allowed to dry thoroughly before it is cut from the drawing board.



Showing Lights and Shadows on Classical Cornice,
and French Method of Rendering.



SHOOTING LODGE FOR MR. ALBERT G. MEIER, HIGHGATE, MO.

Dean & Dean, Architects, Chicago, Ill.

Walls of Logs, and Roof of Split Shingles. Built in 1907.

Rendering Elevations. The object of rendering a drawing is to explain the building. Those parts of the building nearest to the spectator should show the greatest contrast in light and dark, for in nature, as an object recedes from the eye, the contrast becomes feebler and feebler and finally vanishes in a monotone. Every elevation shows the horizontal and vertical dimensions of a building, or details of a building, but in a line drawing the projections of the different parts when in direct front elevation are not shown; and it is to indicate these projections that the shadows are cast and the drawing is rendered. The appearance of a building or any details of a building will be clearly shown by the shadows in their different values of light and dark. (See plates, pages 18 and 23.) The windows and other openings of a building should be colored dark, but not black—although this is sometimes required in competition drawings—and varying lighter tints should be used to indicate the color of the material in the roof and walls, the difference in the color intensity indicating the varying distances from the spectator. Note in plate on page 5, the comparative values of rendering in roof and shadows on roof; also portions of order in light, portions in shadow, and background of column. This method of drawing is frequently carried to an elaborate extent by showing high lights, reflected shadows, etc., and an elevation can thus be made to show almost as much of the character of the proposed building as would be shown by a perspective view or by a photograph of the completed structure. See frontispiece, "Fragments from Roman Temple at Cori." Study the different tone values of the various objects in the foreground and in the background, and note the perspective effect of the background.

It is a good plan, before starting to render a drawing, to make a small pencil sketch to determine the tone values which the various surfaces should have, so that they will assume their proper relative positions in the picture.

Drawings of this kind are much superior to any others as a means of studying the probable effect of the building to be constructed, as they show the character of the building and, at the same time, dimensions can be figured directly on the drawing. It is difficult and unusual to give measurements on a perspective drawing.

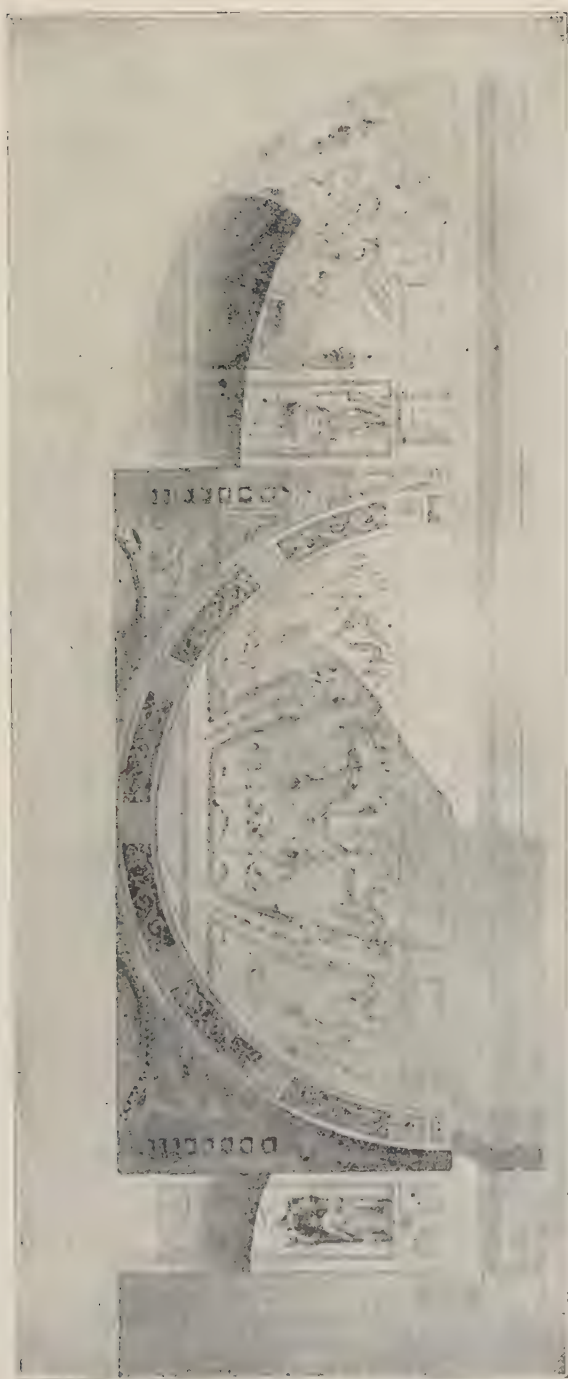
Rendering Sections and Plans. Sections are frequently rendered in the same manner as elevations to show the interior of buildings. The shadows are cast in such a way that they show the dimensions and shapes of the rooms. The parts actually in section are outlined with a somewhat heavier line and tinted with a light tint. The surfaces are modeled just as they are in the elevations. See opposite page.

Plans are rendered to show the character of the different rooms by tinting the mosaic, furniture, surrounding grounds, trees, walks, etc. The shadows of walls, statuary, columns and furniture are often cast, so that the completed rendered plan is an architectural composition which tells more than any other drawing the character of the finished building.

The interior of the building and all covered porticoes are left much lighter than the surrounding grounds because the building is the most important portion of a drawing and should, therefore, receive the first attention of the spectator. The sharp contrast of the black and white of the plan to the surroundings brings about the desired effect. The mosaic, furniture, etc., should be put in in very light tints in order to avoid giving the plan a spotty look. The walls in the plan should be tinted dark or blacked in so that they will stand out clearly. See Fig. 17.

Graded Tints. One rule in laying all tints should be strictly followed: *Grade every wash.* A careful study of the actual shadows on buildings will show that each shadow varies slightly in degree of darkness; that is, shows a gradation. The lower parts of window openings are, as a rule, lighter than the upper parts. Therefore, the washes or tints should grade from dark at the top of the door or window openings to light at the bottom. Furthermore, it will be found that the reflection from the ground lights up shadows cast on the building, so that shadows which are dark at the top become almost as light as the rest of the building at its base.

Windows and doors are voids in the facade of a building, and they have a greater value in the composition of a design than shadows or ornaments in general. This character should be carefully shown in the rendering; and to that end the grading should never show such violent contrasts as to distract the eye from the design as a whole, and thus destroy the unity of the design and



Section Through Vaulted Ceiling, Showing Conventional Shadows and Method of Rendering.

the true mass of the openings. Many good designs are greatly injured in the rendering by the violent contrast in the grading of the openings from dark to light.

In the shadow itself it will be found that detail is accented or

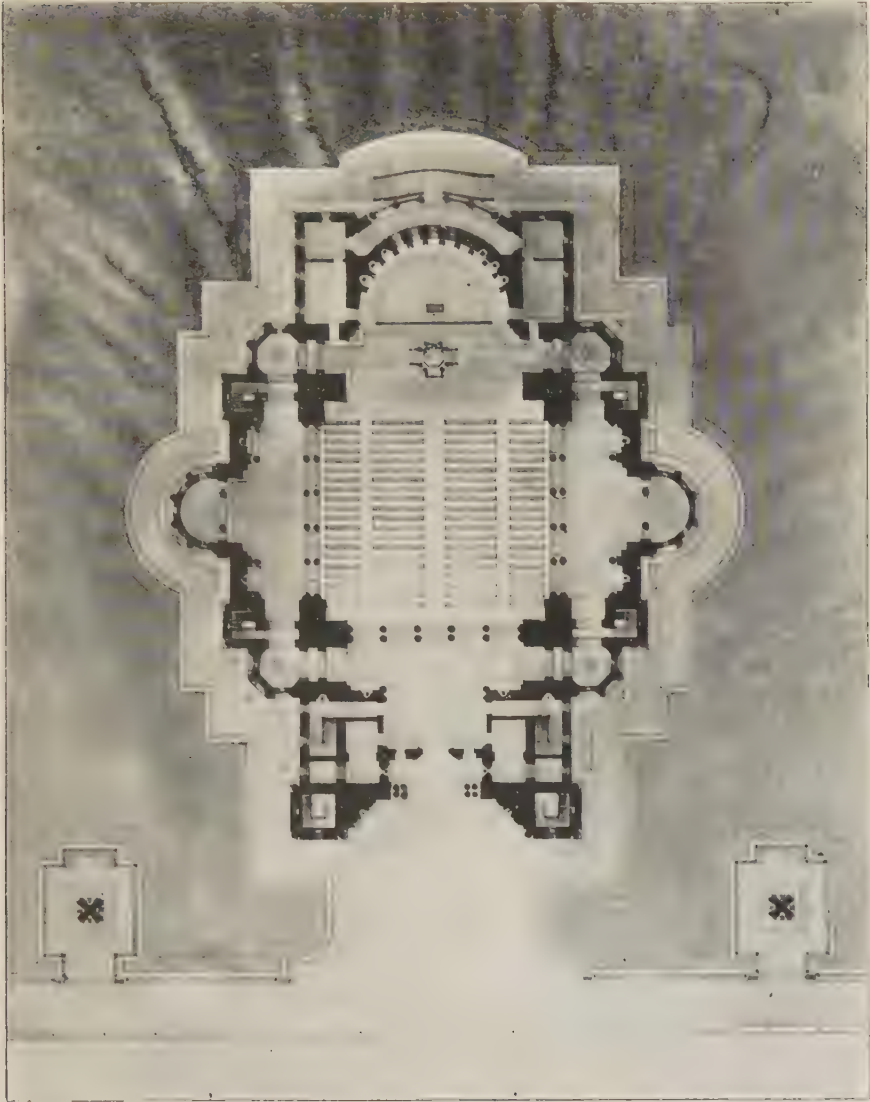


Fig. 17. Conventional Method of Rendering Plan.

brought out by reflected shadows. These shadows are in a direction opposite to the shadows cast by the sun. If the light is assumed to come in the conventional way, namely at an angle of forty-five degrees from the upper front left corner to the lower back right corner, the reflected light may be assumed to be at an angle of forty-five degrees from the lower right front corner to the upper left rear corner, and the reflected shadows will accordingly be cast in this direction. See detail of Greek Doric Order, page 5.

If these are worked up in their correct relation to one another the character of the details will be well expressed.

Distinction Between Different Planes. The different planes of a building which project one in front of the other are distinguished from each other in the following manner:

The parts toward the front have a warm color, the portions receiving direct light have a tone over them indicating the material, the shadows are strong and bold, and the reflected shadows are more or less pronounced. The parts toward the rear, on the other hand, have no such strong contrasts of light and dark. The light parts are often left very light and the shadows put in even tones. The further the object is from the spectator the less pronounced will be the reflected lights and shadows. Note the grading on the steps in plate, page 18, and study the frontispiece as an illustration of this point.

In rendering, a difference should be made for different materials. Note the difference between the stone and the metal work on opposite page.

A FEW WATER COLOR HINTS FOR DRAFTSMEN.

Many draftsmen who are strong in drawing, are very weak in color work. The reason for this is, in most cases, that the colors are not fresh, that the brush is too dry, and that the color values are not correct. *Fresh* crisp color is most important. To get this it is necessary to start with a clean color box, clean brushes, and clean paints. The colors should be moist and not dry and hard.

Tube and Pan Colors. After having acquired some facility in the use of colors, tube colors are the best to use, although they are somewhat more wasteful than pan colors. They are less likely to harden and dry up and are not more expensive. The



Showing Difference in Rendering Stone and Metal.

colors in the tubes can be squeezed out on the palette as needed, and if this is done fresh bright effects are obtained. For the be-

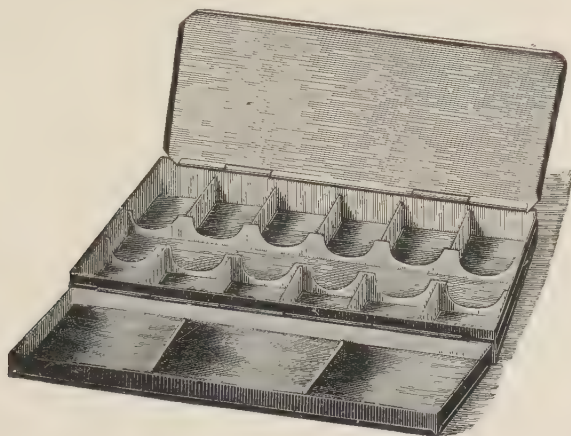


Fig. 18. Box for Pan Colors.

ginner, however, pan colors are recommended, as they are more easy to handle. Fig. 18 shows a jappanned tin box for pan colors, Fig. 19 shows a pan color, and Fig. 20 a tube color.

LIST OF COLORS: The following list of colors will make a very good palette:

<i>Cadmium</i>	<i>Orange Vermilion</i>	<i>Cobalt Blue</i>	<i>Emerald Green</i>
<i>Indian Yellow</i>	<i>Carmine</i>	<i>New Blue</i>	<i>Hooker's Green</i>
<i>Lemon Yellow</i>	<i>Light Red</i>	<i>Prussian Blue</i>	
<i>Gallstone</i>	<i>Burnt Sienna</i>	<i>Paine's Gray</i>	<i>Chinese White</i>
<i>Yellow Ochre</i>	<i>Warm Sepia</i>		

The colors printed in italics are clear colors which will give clear even washes. The others will settle out, the color settling



Fig. 19. Pan Color.



Fig. 20. Tube Color.

into the pores of the paper producing many small spots. This effect is often desirable, giving a texture which cannot be obtained with the clear colors

For use in the offices, India ink, Chinese white, gallstone, carmine and indigo will be found very convenient. The latter three are convenient forms of the three primary colors to use with India ink in rendering. Many draftsmen use these alone.

Manipulation. The washed-out look of many of the color sketches seen in architectural exhibitions is very noticeable. The sketches lack strength and crispness.

Color properly applied should be put on boldly in broad simple washes without fear of too much color. Remember that colors when dry are much lighter than when in a moist state. Use plenty of clear water in the brush. Do not go over one wash with another before the first is entirely dry. This is particularly true where a deeper tone is to be put over a lighter one. In broad sky washes where there is a great deal of paper to be covered, dampen the surface well first with a small sponge, then with a large brush and bold yet light quick strokes put in the sky.

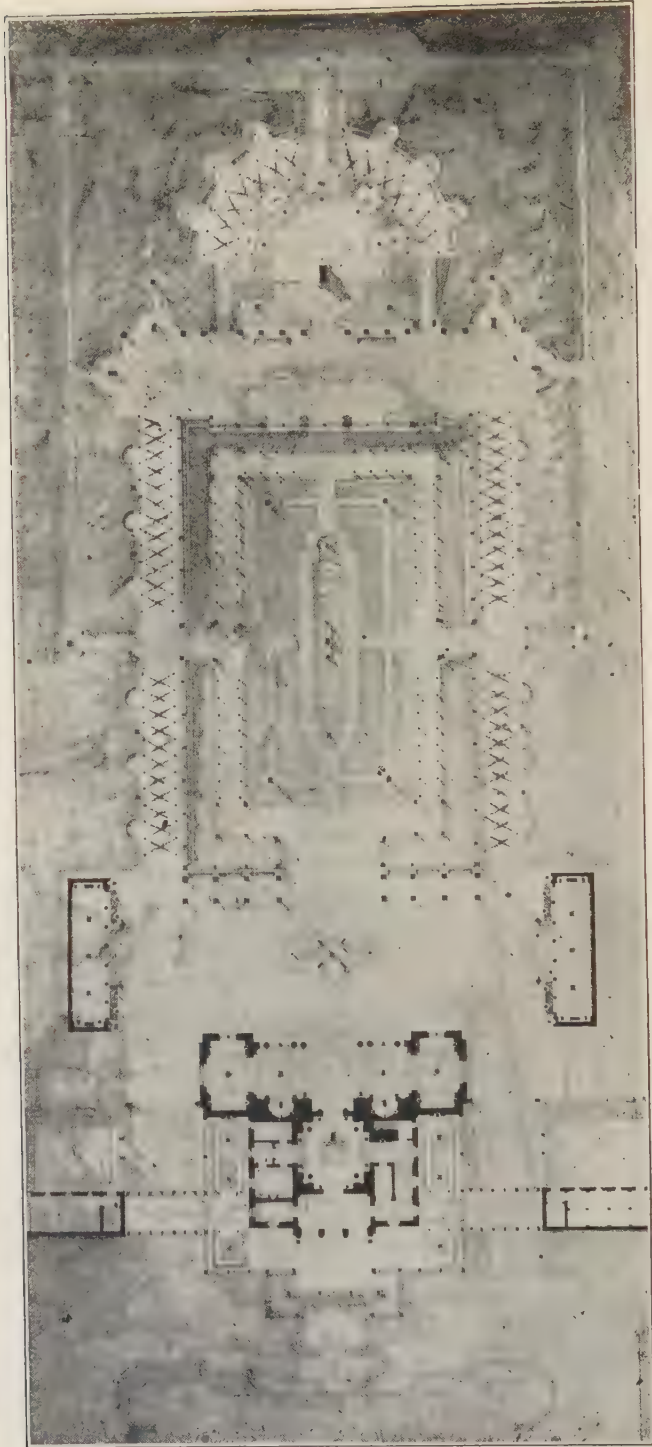
Brushes and Paper. A small brush with a good point is necessary for "drawing in" and for detail. A bristle brush is very useful to remove color and to soften hard lines. Chinese brushes are very good, as they hold a great deal of color and at the same time have a good point.

If an edge shows a hard line, this can be softened by dipping the bristle brush into clean water and rubbing the point lightly over the edge that is too hard, sopping up the water at frequent intervals with a clean blotter. It is important that plenty of *clean* water should be used and that the water be taken up with a blotter very often.

When a "high light" is lost, and a bristle brush does not take out enough color, the "high light" may be put in with Chinese white, mixing it with a little of the color of the material.

Look at your subject broadly and do not try to put in too many details. Whatman's hot pressed 70- or 90-lb. paper is good to use. The hot pressed paper, which has a smooth surface, takes the color better than the rough surfaced or cold pressed paper, but the cold pressed has more texture and gives better atmospheric effects.

Combination of Color. For the inexperienced a few hints as to what combinations of color to use may be helpful. It must



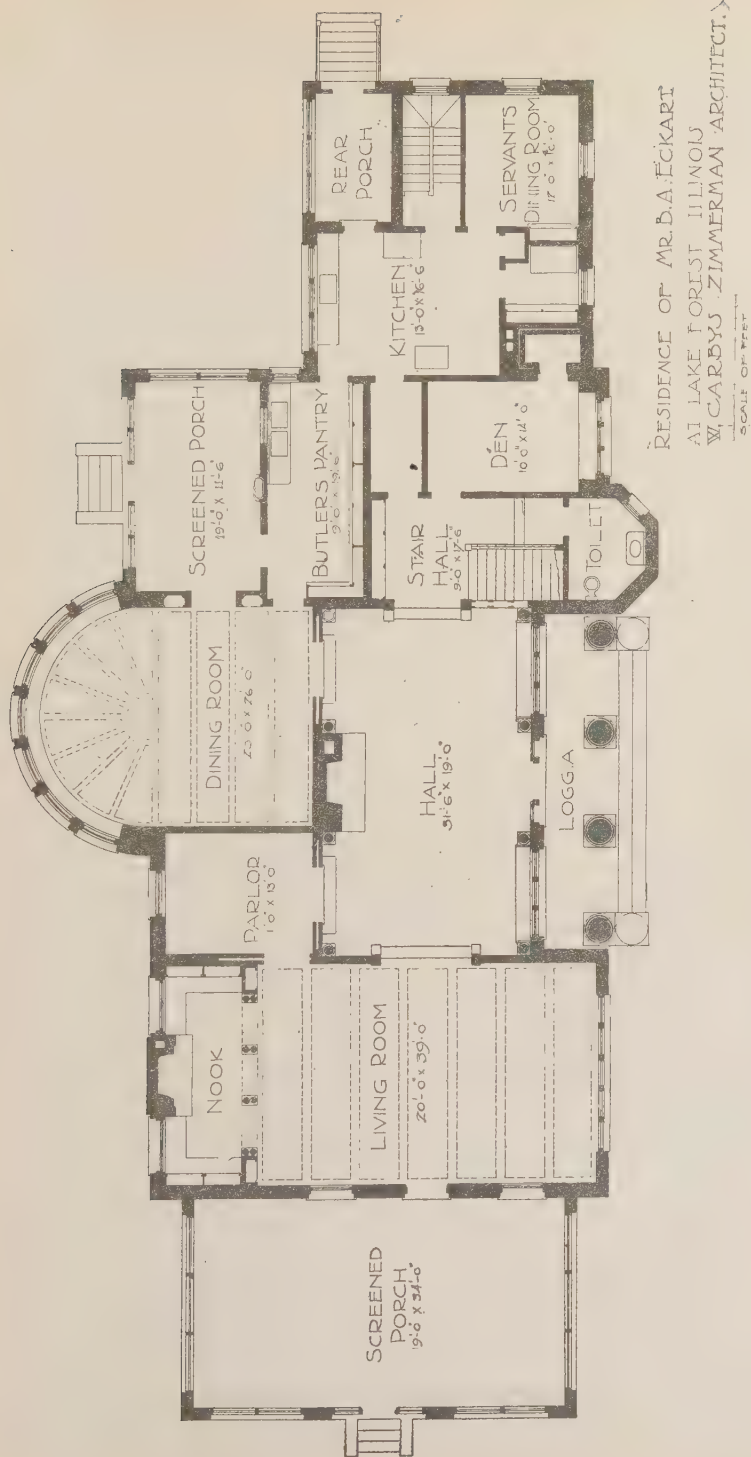
A beautiful example of rendering in wash, showing conventional method of representing a plan and surrounding grounds. This is usually done in strong contrasting colors. The black rectangles indicate statuary; the crossed lines arbors. Note how the shadows of the building, terraces, statuary, etc., help to give interest to the drawing.



RESIDENCE OF MR. B. A. ECKART, LAKE FOREST, ILL.

W. Carby's Zimmermann, Architect, Chicago, Ill.

To be completed in the Fall of 1907. Wall of Colonial Brick; Columns of Reinforced Concrete; Green Tile Roof. This Building Exemplifies the Use of the Classic Column in a Modern Type of Residence, the Column being Structural, and also of Great Architectural Value in Emphasizing the Entrance Feature of the House. For Plan. See Opposite Page.



RESIDENCE OF MR. B. A. ECKART
AT LAKE FOREST ILLINOIS
W. CARBY'S ZIMMERMAN ARCHITECT.

PLAN OF RESIDENCE OF MR. B. A. ECKART, LAKE FOREST, ILL.

W. Carby's Zimmerman, Architect, Chicago, Ill.

The Front of the Building Faces East. A Feature of the Plan is the Way in which the Living Rooms are Separated from the Hall by Having the Floor-Level of these Rooms Two Steps above that of the Hall. The Hall Has a Vaulted Ceiling and Stone Fireplace. For Exterior. See Opposite Page.

always be remembered that the colors must be clean to get fresh bright effects.

A simple blue sky: Prussian Blue, Antwerp Blue or Cobalt Blue.
Clouds: Light Red. For the distance use lighter tones with the addition of a little Emerald Green or Carmine.

Dark part of clouds: Light Red and New Blue.

Roads and pathways in sunlight: Yellow Ochre and Light Red with a little New Blue to gray it.

Cast shadows: Cobalt and Light Red or Carmine with a little green added.

Grass in sunlight: Lemon Yellow and Emerald or Hooker's Green; or Indian Yellow and Emerald Green.

Grass in shadow: Prussian Blue and Indian Red; or Prussian Blue and Burnt Sienna. Aurora Yellow and Prussian Blue gives a green color similar to Emerald.

For gray roofs in sunlight: Light Red and New Blue.

Primary, Secondary and Complementary Colors. The combination of colors may be learned by means of the diagram, Fig. 21, which will assist the student greatly in his water color work. The three primary colors are yellow, red and blue. The combination

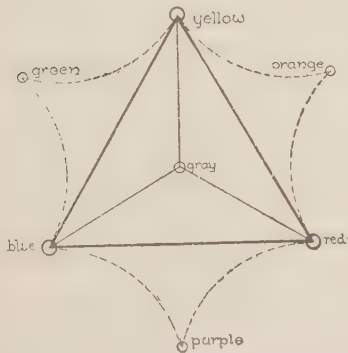


Fig. 21. Diagram of Colors.

of any two of these will give a secondary color—orange, purple or green. Two colors are called complementary colors if the one is composed of two of the primary colors and the other one is the third primary color. Thus, green, composed of the primary colors blue and yellow, has as complementary color the third primary color; *i.e.*, red. Consulting the diagram it will be found that opposite colors are complementary colors; *i.e.*, blue and orange,

red and green, yellow and purple. If two complementary colors are put alongside of one another, each color will look brighter alongside the other than if placed by itself; this is due to the law of contrasts. Thus, the same green if placed alongside red, will look greener than when by itself, and the same holds good for the

red. If complementary colors are mixed together you get a softer color, a gray and sometimes muddy effect. If blue, red and yellow are mixed together in the right proportion a soft gray is obtained.

Water Color Rendering. Where colors are used for architectural drawings they should be mixed fresh, if clear tints are wanted, but in places where it is desired to have certain effects obtained by allowing color to settle, tints that have stood some time may be used. Especially is this true for plans, where the color is allowed to settle in putting in grass, trees, statues, etc. When it is desired to let the color settle it is better to leave the board flat and carry the color along with the brush, leaving it until it is dry. Some draftsmen keep the board level for all their work.

Sketch elevations in pencil may be inked in or may be rendered directly in water color, the shadows being cast and various colored tints laid on to show the different materials, shadows, window openings, etc.

Sketches rendered in sepia only are very effective, putting in the lines with the pen, and rendering with light sepia washes. Elevations are usually most effective when the shadows are put in by washes that grade quickly from dark to light, brilliancy is thus obtained. It is astonishing what effects can be obtained with very faint washes. This applies especially to small scale drawings. The larger the scale of the building or detail, the stronger should be the coloring and values of light and dark.

When sections are colored the parts actually in section are outlined with a strong red line and tinted a very light pink. The colors on the wall are merely suggested.

On the plans the mosaic, furniture, etc., is often shown in a light pink. Where a statue has a prominent place it is put in in strong vermilion. Attention is called here to the fact that lettering on a plan counts as mosaic, and should be done in such a way that it will help the effect sought for, a very important point to remember in competition drawings.

The important thing to remember in rendering is to get the correct relative value of lights and darks. To do this it is necessary to have clearly in mind what the important features to be brought out are and what is the most direct way of accomplishing

this; in other words, the aim should be to make as harmonious a composition as taste, talent and thought can produce.

Water Color Sketching. Nothing is more useful to an architectural draftsman than out-of-door sketching in colors. A water color block should be his constant companion on his Saturday half holidays, and, if possible, he should join some sketching class.

The sketches in water color may be taken from natural scenery, but the student should also make studies and color sketches from color decorations of exterior and interior of buildings.

Do not indicate too much in water color sketching, search for the big masses in shape and color values and put them in direct and simple.

A draftsman who gives his leisure time to water color sketching in summer, and to evening classes in drawing from the antique and from life in winter, will have as good a training as could be wished for in this part of his architectural career.

PRELIMINARY STUDIES IN ARCHITECTURAL DESIGN.

Methods of Study. Different designers work up their drawings in individual ways. Good results are, as a rule, accomplished by getting ideas on paper, comparing and working up the best, and combining different features from the different sketches. Some men of the highest ability prefer to work in this way. Others work up the ideas in their minds before drawing them on paper, often not changing a line once it is put on paper. The latter proceeding is dangerous, as it tends to make the designer satisfied with the first idea that comes to his mind, and makes him unwilling to search for other ideas; he is liable to become narrow and careless.

Putting Ideas on Paper. The problem which the architect has to work out is to make the building of a form and of dimensions best suited to the demands of the client, so that all the parts are in good proportion and in harmony with each other. Much detail in former times was studied on the building in course of construction, but now everything has to be prepared beforehand, and the smallest details foreseen before the building is commenced. The preliminary sketches are generally made on a small scale, one-eighth inch, one-sixteenth inch, or one-thirty-second inch to the foot, worked up from rough thumb-nail sketches often not drawn to scale. Some design-

ers will work up their schemes upon the back of an envelope, and these can be brought into scale in the same proportion in which they are sketched out by means of the proportional dividers.

Architectural work is half way between mechanical drawing and so-called freehand drawing, permitting more freehand work than an engineer would consider proper, and demanding more line drawing than an artist would think of employing.

The most successful architectural design generally comes from numerous freehand sketches, as well as accurate studies, frequent erasing and changing on the original drawing, placing studies side by side and comparing them, until a satisfactory solution is found. It is only by continued practice that freedom of expression is obtained, and without this faculty, the best ideas are useless. The well-equipped architect carries a soft pencil, and sketches as rapidly as possible every new impression on paper.

Use of Tracing Paper. When the plan has been well studied, a sketch of the elevation and section should be made as a check on the "scale" of the plan. Tracing paper should be constantly used, both in making rough studies over the drawing and in making accurate line-drawings for comparison of the different schemes. These drawings on tracing paper as studies in proportion, should be as accurate as the finished drawing, though, of course, no care is necessary in giving them a finished appearance, and the straight lines may run across intersections, and erasures and changes may be made freely.

METHOD OF STARTING A PROBLEM AT THE ÉCOLE DES BEAUX ARTS, PARIS.

At the School of Fine Arts, in Paris, when a problem is given to the students, they are obliged to work one day by themselves getting out the scheme of the building. Each student then takes a tracing of his "sketch," leaving the original at the school. In his own "atelier" or drafting room, he works up the "sketch" with the criticism of his own professor and fellow students. At the end of four or six weeks the finished drawings are sent to the school to be exhibited and prizes or mentions awarded by the jury selected by the school. The preliminary work of the "sketch" is very similar to actual practice, because an architect is often obliged, in a very short time, to get out preliminary sketches for a client, and these

having been accepted, it is his duty to carry them out with as little change as possible, excepting to perfect the proportions and details.

Sketch Plans. The plans, even in the studies, should have the walls colored in with any appropriate color, such as dark gray, as otherwise it is very difficult to see on paper the proportion of the spaces, the ease of circulation, and the general character of the whole in mass and in detail.

Sketch Elevations. After the plans have been thoroughly studied the elevations may be worked up, studying the architectural style and general character of the exterior in relation to the plan. These drawings should be studied over and over again on tracing paper, casting the shadows so that the projection of cornices and sizes of window openings may be seen; at this time also details of a larger scale may be studied in sketch form.

On the elevations or in perspective, the jointing of the stone, brick or terra cotta, may be drawn and this will give a surface texture that may save further rendering.

Perspective Studies. For all smaller buildings, such as cottages, farm buildings and small public buildings, requiring a picturesque treatment, such as a broken roof line, it is better, instead of spending much time on elevations with the shadows cast, to draw almost at the start, a perspective from the most important point of view, and make rapid sketch perspectives from several different points of view.

Perspective Drawing. A perspective should be made of every building designed, primarily in order that the designer may see how planes at right angles—for instance, the side and front elevations—come together, and also how roof lines will look from the customary point of sight. This is especially necessary in buildings of a picturesque character. A perspective is also generally demanded for exhibition purposes, so that clients may gain a better idea of the appearance of the proposed building.

Perspective sketches to explain certain points in the drawings are of great value. Very difficult detail drawings may have sketched on them the details in perspective from different points of view. These sketches will explain more clearly than many careful drawings how certain parts come together. Such drawings are very welcome in the workshop and on the building in course of construction.

EXHIBITION DRAWINGS.

Exhibition or show drawings consist of plans, elevations, sections, and perspectives; the drawings are in line, pencil, pen and ink, or color; and all are carefully drawn and mounted, to show the scheme for the proposed building. These may be the preliminary sketches of an architect regularly employed, or they may be competition drawings.

The plan is blacked-in, the furniture delicately tinted, and the surroundings rendered in monotone or color. On the elevations the windows are colored in with graded washes. Every shadow is cast and tinted in; if in color, the different materials are indicated by different colors. In the sections shadows are cast on the section and the color schemes of the various apartments are suggested.

The general idea of the proposed building is best presented to the public by a perspective view, rendered in pencil, pen and ink or color. The perspective is generally laid out in the architect's office and then it is sent to a professional artist for completion.

SKETCHING.

We have considered drawings made on a drawing board with T-square and triangles. There is another way of drawing, that is, by sketching.

The sketch is the most rapid means of progressing in the art of designing. In sketching an object one examines it more closely than one otherwise would. Not only is it necessary to understand a composition, to distinguish its separate parts, but it is necessary to fix the relation of these parts and to study carefully the proportions. The eye alone is the real instrument for measurement and guide for proportion, and the sketch is the means for training the eye. Practice alone will give facility in sketching.

Do not make sketches primarily in order to collect material, but make them in order *to learn how to see*. Sketch books may be kept as souvenirs, but the profit from them will be more in the instruction gained while making the sketch than in the sketches themselves. Through abundant sketching a freedom in the expression of ideas is also gained.

The point to keep in view in sketching is to show the character of the subject attempted. The exact dimensions one can get only with

the tape-line, but the most carefully measured drawings often fail to show much character. A photograph is liable to represent a subject other than as the eye and hand see it. But if the effect of the subject, the impression of the beholder, can be reproduced in the sketch,

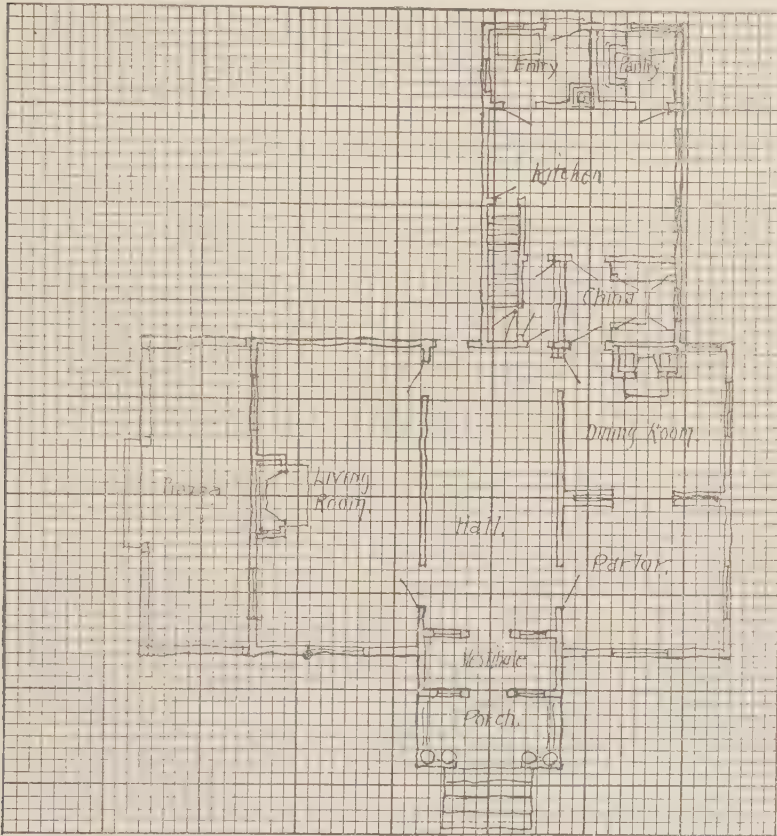


Fig. 22. Cross-Section Paper.

something has been obtained which the tape and the camera cannot hope to accomplish.

Materials for Sketching. At first it is a good idea to use cross-section paper, paper ruled in squares of $\frac{1}{4}$ in. or less, which makes it easier to draw at right angles; but from the moment that the draftsman is able to get along without these lines he should employ only blank paper. A small sketch book should be carried in the pocket. For small pencil sketches a smooth paper (metallic paper)

gives crisp effects, but much rubbing cannot be done. A gray paper gives good effects with pencil or color used as a medium, chalk or Chinese white giving the high lights.

The sketches can be made in pencil, charcoal, ink, crayon, or in colors; the medium of expression is of little importance, as, after having learned to see an object rightly, the drawing can be made, as Ruskin says, "with a stick of wood charred at the end." A sketch should be light and clear. Shadows may be cast, but merely to express the projections, and should be only lightly shaded in.

Subjects to Sketch. In almost every city there are small classes in freehand and charcoal drawing which the architectural student should, if possible, attend; and in connection with every art museum there are generally day and evening classes. But great progress may be made by individual work in drawing interesting objects. Do not commence with making a sketch of a whole building. Sketch individual features, like a doorway, some ornament, etc. Sketches of buildings or motives of buildings should be made in direct projection as well as in perspective. The sketches in perspective will help to explain the geometrical sketches and to teach the student to think in three dimensions.

A great deal can be learned by copying photographs of good work, but the greatest benefit is derived by drawing from nature. By the latter the student learns almost unconsciously the laws of perspective, form, and proportion, and above all learns to think "in the solid." It leads to the appreciation of the fact that architectural drawing is the expression of solids, and in order that these solids shall be successfully shown, the one that draws them has to see them in his mind's eye as they actually are going to appear when built.

He should be very careful in the selection of his models to draw from, and choose only such that are beautiful. Too often the student is told to draw no matter what, under the pretext that it is always an exercise. Without doubt it is difficult to draw any model at first exactly, but what does it amount to if he occupies his time with copying those things which do not stimulate and develop his sense of beauty. There is no better practice than to draw a flower, a leaf; and if he has access to museums, etc., he should draw from the antique models, sculpture, and ornamental subjects. By drawing

the latter he can learn besides how in olden times natural objects were conventionalized for use in decoration.

Memory sketches are excellent practice. Go to see a model, study it as carefully as possible; then go home and make a sketch of it. The student may be sure that his memory will betray him, and he should go back to the subject and study it again and again—twice or three times if necessary—after which he will finally arrive at a reasonably accurate sketch.

MEASURED WORK.

There are two occasions for making measurements of old buildings; one, when it is proposed to make alterations; the other, for the sake of study, making drawings of portions either for immediate study or future reference.

Materials. It is a good plan if possible to take a small drawing board, T-square, and triangles to the building. Cross-section paper ruled one-eighth inch between light lines and one inch between heavy lines is very convenient. See illustration, Fig. 22, showing use of cross-section paper. Drawings may be laid out directly to scale on this paper, at one-eighth, one-quarter, or one-sixteenth inch to the foot, or details drawn at three-quarters inch to the foot, or full size.

Measuring Tapes. The dimensions should be taken with a tape, and for architectural work a "metallic" tape or cloth reinforced with fine wires and having clear figures, is very satisfactory, though it will be advisable to use a steel tape for very accurate work.

Datum Lines. As a general rule, it is best in frame buildings to take the horizontal measurements on the sill line, making a small section to show the relation of the sill to the walls. In brick and stone buildings they should be taken on the outside wall face or ashlar line. For heights, the finished floor levels should be taken as starting points, the main first floor of the building being the general datum. If there are many projections in plan it will be well to draw a straight base line and measure it from this line. If old buildings are out of level it will be necessary to use a straight edge or draw a level line on the wall and measure up and down from this level.

Hand Level. The hand level will be found very convenient for obtaining approximately the grades about the building. This

is a small instrument used by railroad engineers in working out the elevations on each side of the track. The level can be also obtained by looking toward the horizon, pulling down the hat brim until the point coincides with it, turning on the heel carry the horizon level to the direction desired. This will give a point at the level with the eye.

Elevation Measurements. Total distances should be taken, and interior heights from floor to floor (with thickness of floors) should be run from basement floor to top of roof, and if possible a line should be dropped down the outside of the building to check this. It is well to mark size of glass, and give outside dimensions of sashes,

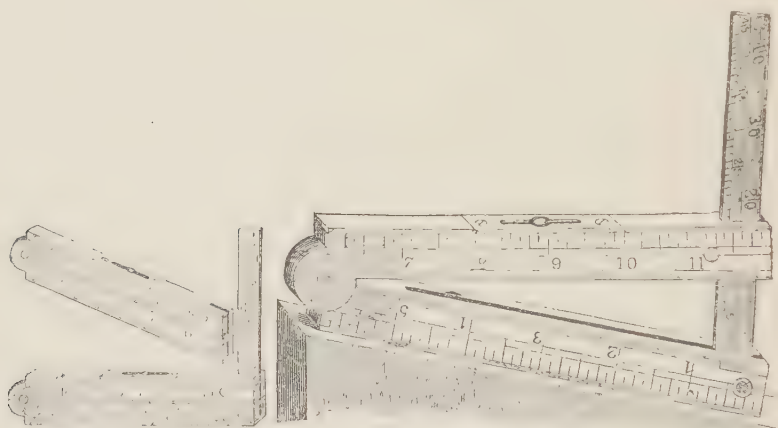


Fig. 23. Twelve-inch Single Jointed Rule and Level.

taking dimensions to centers of windows or edges of stone or brick openings. Measurements are given by some architects from frame to glass openings. Sketches or details should be made of typical windows, and variations from the type. Roof pitches may be obtained by a level and measuring the rise per foot, or outside dimensions and total rise may be taken. A convenient instrument for doing this work is a twelve-inch single-jointed rule and level, shown in Fig. 23.

Arches. In measuring arches, the height A, Fig. 24, from the ground to the spring of the arch should be given, the total height B, and the width C. The curve is obtained by giving the length of the radii or by laying a straight edge, D F, against the curve and measur-

ing the distance D E, which will locate one point in the curve. Other points may be taken by offsets from the straight edge.

Projections. Projections are obtained by measuring in from a plumb line. The diameter of columns may be ascertained by means of two parallel straight edges or by dividing the circumference by 3.1416.

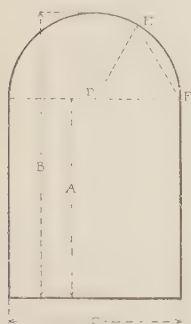
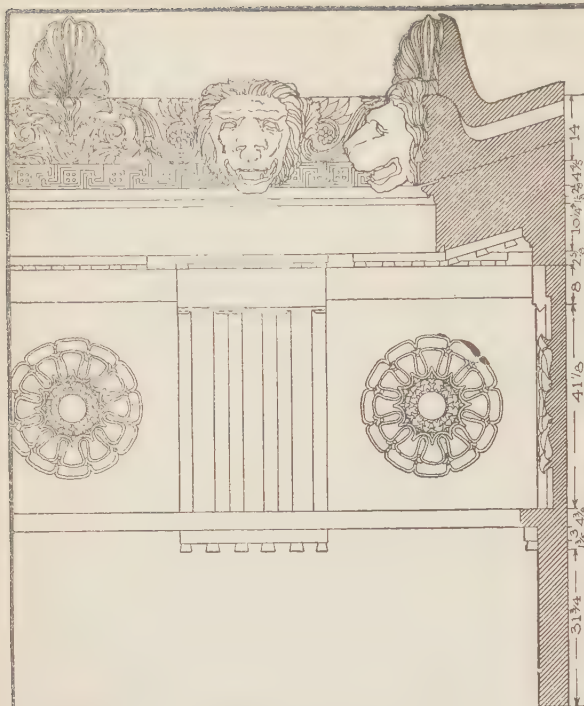


Fig. 24. Measurement of Arches.

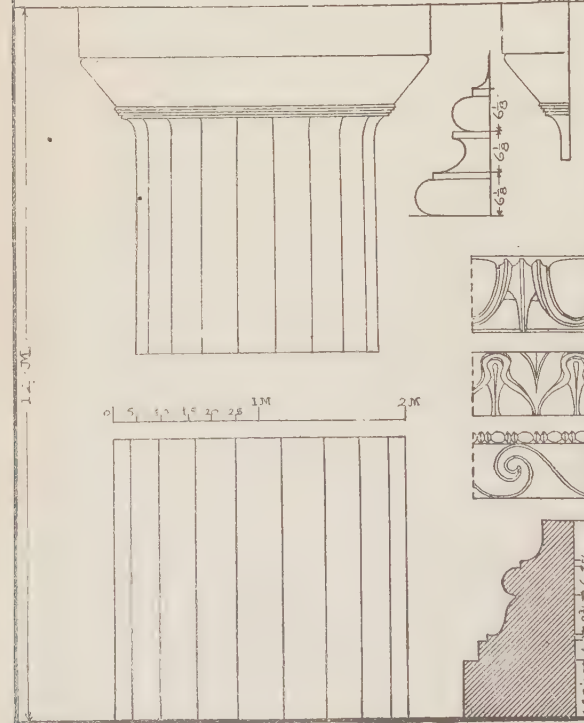
Inaccessible Portions. In places where it is impossible to reach the point it is desired to measure there are several ways of obtaining the dimensions with considerable accuracy. A photograph should always be taken of the building measured, and a proportional scale can be made from the known dimensions, which can be used on the photograph for determining unknown dimensions.

Approximations. In brick, stone, clapboarded or shingled buildings the different courses may be counted and the totals figured from those that can be measured. Where rapid memorandum sketches are made, distances may be easily obtained by pacing, some men taking nearly a three-foot pace, others walking easily five feet in two steps. In this case every other step is counted as five feet. The total heights may be obtained by measuring up as high as can be reached, then standing at a distance, holding a pencil at this known height, measuring the distance by the eye to the top of the building. Or, a man's height can be taken to gauge the approximate height. The foot rule may be held up at such a distance from the eye that every quarter inch corresponds to a foot on the building, and the dimensions can be read off in this way.

Rubbings. Rubbings may be taken of tablets, lettering and flat ornaments by laying paper on the ornament and rubbing over it with a shoemakers' heel ball. The pattern cut in will be left white and the rest of the surface will be blackened by the heel ball.



THE TEMPLE AT
EPIDAVROS
SHOWING CONTEMPORANEOUS USE OF
GREEK DORIC AND
CORINTHIAN ORDERS



ARCHITECTURAL DRAWING

PART II

PRACTICAL PROBLEMS IN DESIGN

NOTES ON THEORY OF DESIGN

Composition. It is impossible to formulate laws of composition which, even if faithfully observed, will absolutely insure satisfactory results. That is to say, any work of art—such as a picture, a statue, or a building—may comply with all the general laws of composition and still not be really artistic.

A great deal depends on the feeling of the designer. A carpenter may make a cornice for the exterior of a house, or a mantel-piece for the interior, without having been taught any of the formal laws of composition; and nevertheless, by careful study and through the desire to build something pleasing, may produce something much more artistic than the most carefully wrought effort of a designer who knows all these so-called laws but lacks all artistic feeling.

Workmen in the various trades can assist the architect materially in producing an artistic result. One of the most desirable characteristics in a workman is that he shall execute the wishes of the owner as expressed in the architect's drawings, and carry them out as artistically as possible in every detail. There is a certain character in every piece of work which every workman should try to understand and carry out in a simple, frank, decisive, and straightforward way. Every workman feels the value of truthfulness in work, and objects to sham in doing good work.

Turner, the great English painter, was a man who did everything that he had to do, no matter how trivial, well. John Ruskin says of him, in his lectures on architecture and painting:

"He took a poor price that he might live; but he made noble drawings that he might learn. He never let a drawing leave his hands without having made a step in advance and having done better in it than he had ever done before."

Composition is the art of bringing together various interesting details, so that the whole result will be harmonious and pleasing.

The important features should be on axes, or grouped symmetrically on either side of an imaginary center line. For instance, in a room, if the fire place is to be one of the features, it should be centered on one of the axes of the room. The remaining features should be arranged with relation to the axes or center lines of the room so that as a mass they will balance each other.

In a good composition some single feature should dominate—for example, in a building, the main gable, or a tower, or a long, simple roof line; or in a room, the fireplace or a painting; etc. In decorating a house, the general effect should be pleasing, and should not be too much broken up by spotted details. There must not be too many equally interesting points; otherwise the result is either monotony or competition; one point must dominate. There must not, for example, be other gables competing with the main gable by being too near the size of the main gable. For the same reason it is better to group windows and other features in odd numbers and accent the central one.

It is well to think of the location of the different interesting points. In a cottage—to take an example—the gable that is seen from the best point of view should be near the center of the perspective; or, again, a tower should not be isolated or appear so much at one side from the best point of view that it will look as if disconnected from the house.

The smaller parts of the composition should have a proper relation to the main motive. The dormers, for instance, in a cottage, should be in the same style as the main gable, or in harmony with the style.

Nevertheless, all these different parts must be used so that there will be some contrast, in order to give life and interest to the composition. No detail from a different style, however, should be brought in without the designer being sure that the harmony of the composition is not thereby disturbed. To learn how to compose, it is not sufficient to study books and receive instruction in the school or in the drafting room; the student must supplement this with the study of nature and of objects and buildings themselves.

Scale. The word "scale" has been used to designate a measure of distance—for example, a scale of one-quarter of an inch to a foot.

"Scale" is used also in another sense—that is, to designate the appearance of a building or any artistic composition, which, without

considering the actual dimensions, gives us an idea of the size. For example, in the two sketches A and B (Fig. 25) the two vases have the same proportion; but one is a huge decorative vase standing at the side of a fireplace, while the other is a small vase standing on a table:

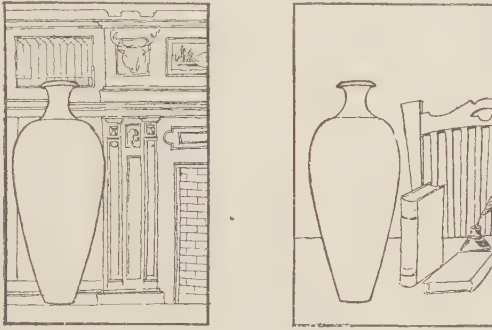


Fig. 25.

It requires the books and other details of well known dimensions to suggest the small scale of the one, and the mantel-piece to suggest the scale of the other. The same principle is seen in doors and windows, in the effect of steps in front of a building, in balustrades, and in all details with which we are familiar in our daily life.

A drawing is "large in scale" when it appears to be drawn at a larger scale than has been really used; for example, a drawing of a building might look as if it were laid out at quarter-inch scale when it was really laid out at one-eighth-inch scale. If such a building were erected, it would be much larger than the drawing would indicate. On the other hand, if it is "small in scale," the details are too small and the building will appear as if it were built for dwarfs.

The materials used in construction affect the scale of a building—such as sizes of brick, stone, clapboards, etc. Arches span larger spaces than lintels; iron construction needs fewer supports than stone construction. The detail should be somewhat larger in scale in the upper part of a building, where it is seen from the ground, from what it is in the lower portion near the observer. Interior detail should be finer and smaller than exterior detail.

Statuary, when called "life-size," is actually made about one-quarter of the height larger than life size. The reason for this is that objects in the open air, or in large spaces, look smaller than they

actually are. The size also depends largely on the height from the ground.

If a building does not appear to be in good scale—that is, if the drawing does not suggest the actual size of the building (which may be tested by sketching in a figure of a man, and measuring to see if the house is in scale or not), the detail should be studied to see that it is not too large or too small; other details may be added, such as steps or balustrades; or, if the design is an interior, the walls may be decorated with natural objects in the right scale. Anything that will suggest the height of the human figure may be used, or stone joints and other suggestions of material may be made more evident.

Ornament. Architectural ornament is the decorative treatment of architectural motives on a building. The ornament should be carefully studied on the small-scale designs, and worked up from these to the working drawings.

All ornamentation or decoration should be drawn out on each design, and particularly on the small-scale drawings, even if it is to be carried out by other designers, modelers, or decorators; for it should be remembered that the one man who is to bring together into a single composition all the elements of a design, is the Architect. The decoration, whether sculptured or painted, is executed either from scale details or full-size drawings, by the decorator or sculptor. If any change is made from the main lines of the design, this change should be studied on the small-scale drawings; otherwise it may be found that the detail is entirely out of scale with the general architectural lines.

It should be clearly understood that loading a building, a mantel, a cornice, or any motive with ornament does not make it a work of art. Everything depends on where and how the ornament is applied. Besides, generally, any motive is more artistic if it is perfectly simple.

Criticism. All through the work of design, it is of greatest advantage if criticism can be obtained from other architects and draftsmen; and even the criticism of outsiders, conscientiously made, will frequently suggest valuable improvements in design. Whenever an intelligent criticism is received which suggests a change, it should be a matter of principle with every designer to make a sketch embodying this change, in order to see whether or not the criticism is good.

DESIGN OF THE DWELLING

The plan of the modern residence began to be worked out in the 18th century. There is a treatise on architecture published at that time by Blondel, who says that a complete reformation had been made in the architecture of large and small dwellings from the point of view principally of the arrangement of rooms; great efforts had been made to substitute for the long, rambling succession of single rooms, an arrangement of rooms double in depth, with separate communications so indispensable for conveniences in a building.

It became clear that in a dwelling the ease of circulation was very important, and that the approaches to and exits from the various parts had to be well worked out, for the living rooms as well as for the service rooms. The aim of architects in the 18th century was for *independence* in the house, and it is to this that we owe their very remarkable plans.

The treatise on architecture by Blondel contains many interesting plans, well worthy of careful study. On the subject of Room, in particular, Blondel gives some interesting data:

"It seems", he says, "that within about fifty years French architects have, in this respect, invented a new art. Before this, our edifices in France, in imitation of those of Italy, had an exterior decoration which made a very beautiful architecture; but the interiors were hardly livable. The architects seem to have tried to keep out the light; one could hardly find a place for a bed and for the principal articles of furniture. The fireplace occupied the largest part of the rooms, and the smallness of the doors gave an inadequate idea of the places to which they gave entrance The arrangement should be the first object of the architect; decoration depends absolutely on a well-studied plan. It is the arrangement which establishes the length or width and the height of a building."

Number of Rooms. The great objection to many small houses is that the people want the same number of rooms for a small amount of money that others have where more money has been spent. A desire to have six rooms and a bath often results in making all the rooms tiny and uncomfortable—more like boxes than living, habitable spaces. These houses are not necessarily cozy just because they are small; a cozy corner in a big room has much more of the cozy feeling than is found in the small rooms of an apartment. There should be one good-sized room in every house or apartment, even though one room has to be sacrificed.

Hallway. The hallway should be neither a cramped, narrow

space, nor arranged in such a way that it will be a draughty part of the house. It should be borne in mind that if open from first floor to roof, the heat will pass up the hallway; for that reason it should be sufficiently closed off from the other rooms. It may be arranged as a comfortable gathering place for the family. Indeed, with the staircase kept properly to one side, and with a large fireplace the hallway may form the central room of the whole house.

Stairways. Some men say that they build a house around a bathroom, because they consider that the most important room in the house. Next in importance is the staircase. The front staircase should be easy and large. A 7 to 7 $\frac{1}{4}$ -inch rise, with 10 to 10 $\frac{1}{2}$ -inch width of tread, is customary, though a 6 $\frac{1}{2}$ -inch rise with an 11-inch tread is easier and looks much better. Staircases, in the better class of house, may be as easy as 6-inch rise by 14-inch tread, or even 5 $\frac{1}{2}$ -inch rise with 15-inch tread. In back staircases a 7-inch rise with 9-inch tread is not too steep; and they are frequently found as steep as 8-inch tread. If space allows, the rear staircase should be sufficiently wide to take up trunks and furniture—say 3 $\frac{1}{2}$ to 4 feet, with wide doors (3 feet 3 inches) opening into it. In this case the stairs should be strongly supported. Staircases may be made fire-resisting by stopping the space between the stringers with brick and by covering the underside or soffit with metal lath.

Proportion of Stair Riser to Tread. A good formula to use in laying out a stairway is as follows: Let R = the rise and T = the tread, then

$$2 R + T = 25.$$

i. e., twice the height of the riser plus the width of the tread should equal 25 inches.

Living Rooms. The living room, library, parlor, reception room, should all be “livable.” The shut-up “best room” is a thing of the past.

Sitting Room. This should have a southerly exposure, so that it will be sunny and cheerful all the time.

The best arrangement for a sitting room is to have the fireplace at one end, the windows at the side, and the entrance at the further corner. The next best arrangement is to have the fireplace on the same side of the room as the entrance, and both on the long side of the room. The most unsatisfactory arrangement is to have the door

on the wall opposite the fireplace or close by the fireplace, where there is a constant draft.

The room should express comfort and restfulness. There should be no feeling of over-decoration, and nothing in the room should be so striking as to be the first and only thing to be seen. The great objection to so-called "decoration", is that each decorator or designer thinks only of his own work, consequently making it prominent; and it is extremely difficult to make the decorative elements harmonize.

Dining Room. The dining room should be, as a rule, on the side of the house toward the morning sun. It should be cool in summer and warm in winter, as it is the one room that is necessarily occupied at least three times a day. A westerly outlook is generally disagreeable on account of the low-lying sun for the evening meal.

Butler's Pantry. The butler's pantry should have an outside window, and doors leading into the dining room and kitchen. Sometimes a slide is put in, opening into a small china closet in the dining room. The butler's pantry should be quite large. The story is told, of an architect who dined with his client several times while he was making the sketches; and each time, on his return to his office, he enlarged the butler's pantry, and when the building was erected it was still one of the cramped rooms in the house.

Kitchen. The kitchen should not be placed in too close proximity to the living rooms, and should be on the northwest corner of the house. As a rule, it should be separated from the living parts of the house by at least two doors. This is done, partly on account of the odors from the cooking, and also because of the heat. A basement kitchen is objectionable on this account. The kitchen should be thoroughly ventilated, the windows being set high—as near the ceiling as possible—to let out the hot air, the sill being located above the backs of the tables and sinks. A hood over the range connecting with a ventilating flue, is very useful for ventilating. This ventilating flue will be either a space around the flue from the kitchen range, which will be constantly warm; or it may be a separate, square flue next the smoke flue in the chimney. It is advisable sometimes to put deafening felt over the kitchen, so as to prevent the passage of sound and heat if there are sleeping rooms above.

Refrigerator. The refrigerator should be located so that it will be easily accessible from the outside, for putting in ice; and it should

be near the kitchen without being too near the range. The refrigerator drip should never connect directly with the sewer but should have a separate pipe leading to a dry well outside the building. The simplest and cleanest way to trap this is as follows: Build a galvanized-iron pan large enough to rest on the floor under the drip-pipe of the refrigerator; and carry lead pipe from this down into the cellar, ending in an ordinary milk jar which stands in another galvanized-iron drip-pan connecting with the dry well.

Storeroom. The storeroom may be made rat-proof by plastering on metal instead of wooden lath, and by plastering the ceiling underneath with the same lathing, taking the precaution to cover all openings.

Bathroom. The bathroom may have tile floor and walls, or, for ordinary work, a Georgia pine floor, with North Carolina pine sheathing four feet above the floor. A sanitary base—that is, one rounded to avoid a corner between the wall and the floor, such as is used in hospitals and in many schoolhouses, may be used. Waterproof paper should be put in between the upper and the under floor in the bathroom, being connected by lead flashing with the outside of the building. This will prevent damage in the case of an unexpected overflow.

Lavatory. A lavatory on the first floor is very convenient. This may open from the hall or be connected with a coat closet. It should have a window.

Closets. The closet doors should open in such a way that the light from the window shines into the closet.

On the sleeping-room floor, a housemaid's closet may be provided—if possible with an outside window. This closet should contain a galvanized-iron or enameled-iron sink, provided with a flushing tank as well as with hot and cold water faucets.

The linen closet should preferably have no drawers, as they furnish hiding places for mice. Shelves will answer every purpose.

Bicycle and dark rooms, play room, sewing room, billiard room, music room, den, conservatory, etc., should also be considered.

Cellar. The cellar should be well drained, if possible, with a drain-pipe separate from the soil-pipe. There should be a blind drain under the wall, and the wall should be damp-proofed in damp locations, by the use of layers of slate stone extending through the wall at the surface of the ground, or layers of well-tarred paper at this point.

Waterproof cellars are made by putting down several layers of tarred paper well mopped with hot tar or asphalt, on which the concrete cellar floor is laid. As a rule, however, it is best to have the cellar connected either with the soil-pipe or with the blind drain, and to have all the concreting put in so that it will slope to one point, where will be placed a trap with grating.

VARIOUS STAGES IN BUILDING A HOUSE

The point where the majority of people, who know nothing about architecture, come in contact with the architect, is when they make up their minds to build houses of their own.

To develop this point more clearly, let us consider the situation that arises when a business man wishes to build.

The problem, as it comes to most men, is a question of number of rooms needed, amount of money available, and proposed location of house.

Let us say that Mr. Smith, after looking at various lots and making as many inquiries as possible through friends and acquaintances, and having also gone to some real estate agent who deals largely in land in such locations as he considers desirable, has obtained an option on, or possibly has purchased, a lot, the price being, say, \$800. He has available \$2,000, besides the money he has set aside for furnishing the house and paying the architect's fee. He is willing to give a mortgage on the house for, say, \$3,000. Taking \$4,600 as the value of his proposed house would leave him a margin of \$400. Accordingly, he goes to an architect who, he he thinks, will plan his house satisfactorily, and tells him the circumstances, the requirements, and the amount of money available. A visit is made to the lot, to get the points of view, etc., and preliminary sketches are made.

Sketches. From the architect's point of view, the sketch period is vital in respect to the success or failure of the house. It is at this time that he becomes acquainted with the owner's ideas and does his best to interpret them properly so that there will be no criticism or feeling of disappointment on the part of the owner—in other words, so that the house will harmonize completely with its owner's habits and tastes.

Every man has certain hobbies and independent wishes in regard

to his house; these the architect should study and give the proper expression.

In regard to the practical use of the house, every member of the family, should be thought of and consulted. The architect should obtain a careful outline of the requirements from the owner, going over the number of rooms, size of rooms, comparing them with rooms already known to the owner, heights of stories, location and exposure of rooms, for the view, etc.

After sufficient data have been procured to make a complete schedule, several different plans of the proposed house may be sketched out at a small scale. Co-ordinate or section paper is very useful in sketching out different schemes. As a general rule, it is better for the architect to work out with great care some one plan which he considers the most satisfactory. In dealing with some clients, it is sometimes better to show this plan only; in the case of other clients, it is better to show them all the studies and consult with them about details that would be merely wearisome to other men. The sketches are generally laid out to the scale of one-eighth inch to the foot, though small "thumb-nail" sketches are frequently made at no scale, or sometimes several different schemes at a scale of one-sixteenth inch to the foot. Memoranda should be kept of all conversations with the client, for use in completing plans and in writing specifications.

Working Drawings. After the sketches are approved, the working drawings can be started. They are sometimes called "contract drawings," meaning, the scale drawings accompanying the specifications and contract, though contract drawings really include the details, which are not generally made at the time the contract is signed. The character of these drawings has changed very much, even in the last few years, an astonishing amount of detail being put into the working drawings, while the architectural drawings of the English and Italian Renaissance show that the old masters must have studied much of their detail while the building was being erected. The main purpose of the working drawings is to give complete information of the building to be erected, as far as size and form can be expressed in projection, quality and general description being left to the specification. It is of considerable importance to put on a single drawing as much as

can be clearly expressed, since workmen generally are not inclined or able to gather information from several different drawings.

The working drawings are laid out at quarter-inch scale,* *i.e.* one-quarter inch equals one foot, with details at a scale of three-quarter inch to the foot, accompanied with full-size details. This is the customary scale in America. In England and also in some American offices, the rule is to make the working drawings at a scale of one-eighth inch to the foot, with details at a scale of one-half inch to the foot.

Plans of every floor, including basement and roof, all the elevations, and such sections as may be necessary to explain the construction, are required. In the sections, the vertical dimensions should be figured from finished floors.

Besides these drawings, a block or ground plan is frequently given, generally at $\frac{1}{16}$ or $\frac{1}{32}$ inch to the foot, to show adjacent walls, gardens, etc., and layout of grounds, location of drains, dry wells, cesspool, and water supply.

Separate plans may be given in procuring estimates for heating, ventilating, plumbing, and gas and electric lighting. These should be made subject to changes that may be proposed by the successful bidder, and, with these changes, should be presented by him to the architect for approval before finally going ahead with the work. This method is followed, because a guarantee is expected from the contractor for the successful operation of his work; and each contractor in the trades mentioned is likely to have good methods of his own, which he should be allowed to use. Sometimes all of these drawings may be incorporated in the general drawings.

Full-Size Details. Mouldings, and special parts of exterior and interior finish, such as base-courses, water-table, belts, cornices, capitals, special arrangement of brickwork, panels, carving, window-casings, mantels, stair-newels, balusters, etc., are drawn full size; carefully drawn sections are made full size. "Key drawings" at small scale, isometrics, and freehand perspectives are invaluable aids if drawn on the full size drawings. For cast iron and terra-cotta, allowance is sometimes made for shrinkage. This should preferably be left to the pattern-maker.

*NOTE:--There is a great difference between "quarter-inch scale" (*i.e.*, $\frac{1}{4}$ inch = 1 foot) and "quarter scale," or one-quarter of full size (*i.e.*, 3 inches = 1 foot).

Besides the contract drawings and subsequent detail drawings, other drawings are frequently called for, for which allowances have been made in the contract, as for furniture, special finish, etc.

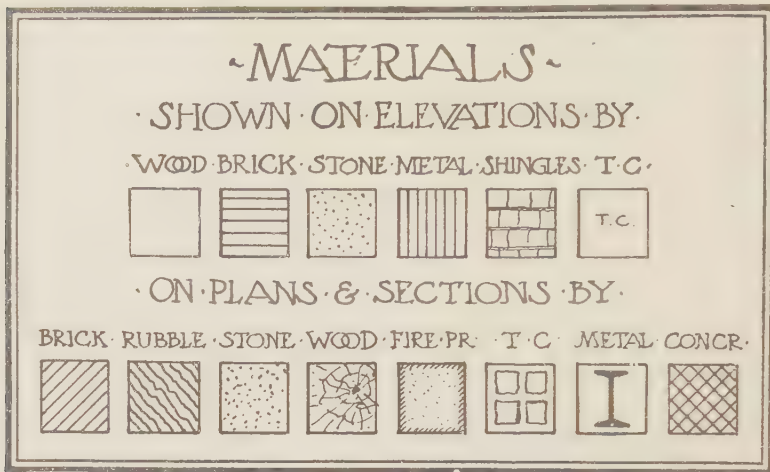


Fig. 26.

Representation of Materials. This may be either by blacking in, hatching, etc., or by use of colors. The former method (Fig. 26) is convenient for tracings to be blue-printed, as it saves coloring the prints.

On elevations, materials are shown as follows:

Wood	white.
Brick.....	horizontal lines.
Stone.....	dotted.
Metal.....	vertical lines.
Shingles	sketched to scale.
Terra-cotta, etc.....	abbreviations marked "T.C.", etc.

On plans and sections:

Brick.....	diagonal hatching, ruled lines.
Rubble.....	diagonal hatching, wavy lines.
Stone.....	dotted.
Wood	grain indicated, or black if small-scale.
Fireproofing	hatched margin, dotted surface.
Terra-cotta.....	divisions to suggest material.
Metal.....	steel sections suggested.
Concrete.....	cross-hatched.
Old work	white.

If colors are preferred, the following may be used:

Brass and copper.....	yellow.
Brick.....	light red.
Concrete.....	Payne's grey, mottled.
Glass.....	new blue.
Glass in elevations.....	a graded wash of India ink, indigo, new blue with a little carmine.
Old work.....	grey or black.
Plaster.....	Payne's grey.
Sections.....	construction not determined, pink with red border line.
Shadow in elevation....	India ink with indigo or gallstone.
Slate.....	indigo.
Steel and iron.....	Prussian blue.
Stone	raw umber or new blue, or Payne's grey.
Terra-cotta.....	burnt umber.
Tiling.....	light red with yellow.
Wood.....	yellow ochre.

Coloring may be carried further, following this scheme, always placing guide-squares in one corner of the drawing with the names of the materials represented.

Tracing and Blue-Printing. Drawings of which several copies are needed, may be traced on transparent paper or linen, or laid out directly on these materials. Thin bond paper is often used. Prints may be taken from these, either blue or brown prints, giving white lines on a blue or brown ground, or by first taking negatives, dark lines on a white ground.

Notes should be kept for the specifications while drawings are being made.

Letting the Contract. When the working drawings and specifications are finished, owner and architect decide on three or four builders, any one of whom would be satisfactory, who are asked to submit estimates. The builders are allowed time enough to go over the plans and specifications carefully so that they may know the actual value of the work; and bids are sent in to the architect's office to be opened on a certain day, when the owner meets the successful bidder and a contract is signed for building the house.

In France there is generally a separate contractor for each kind of work; in England a general contractor makes up his bid from quantities given him by a quantity-surveyor; in America usually the sub-bids are given to a general contractor who takes the responsibility for the whole work.

The work generally starts immediately on the signing of the contract, and is carried on continuously, with visits from the owner and from the architect, payments being made at regular intervals or on completion of certain parts of the work.

During the progress of building, the owner and architect select fixtures, wall papers, etc.

BUILDINGS FOR OFFICES

The plan must be laid out so as to obtain the largest possible amount of space available; it must be made with reference to the constructive requirements.

Arrange the offices so as to take advantage of surroundings and light. A good outlook makes an office more desirable.

Staircases, elevators, piers, etc., should be arranged so that the actual renting space will be an open loft, where offices and windows can be divided up easily to suit different tenants, and can be easily changed.

Make the street entrance and corridors so that the offices can be easily reached and doors and signs easily seen. The corridors should not be less than 3 feet 8 inches wide; as a general rule, they should be 4 feet to 8 feet wide, depending upon the use, the number of offices and the size of the building.

Arrange janitor's and superintendent's offices, telephone, telegraph, news booths, and elevators so that the tenants and public may be quickly accommodated.

As a rule, unless there are two frequently used entrances, the elevators should be placed so that they can all be seen by a person entering the building.

A car 5 feet 3 inches by 6 feet, with a door on the long side and the rest of the side removable, is convenient for handling ordinary office furniture. One elevator in the building should be as large as this. Other elevators may be smaller.

If a building is more than 6 stories high, it is advisable to have one or more elevators express to the 6th story. The doors at the lowest floor, where the largest number of passengers pass in and out, and where there is generally a "starter" to see that the cars are not overcrowded, may be arranged so that the whole side of the car will open, allowing all the passengers in the elevator to pass out at once.

Staircases are rarely used in an office building. A width of 3 feet 3 inches is generally sufficient; and sometimes staircases are as small as 2 feet 9 inches.

If there is a light court, it should be of such shape and location as to receive as much sun as possible.

There should be toilet rooms on every floor; generally lavatories are placed in the separate offices. Radiators are put in front of each window, transoms over every door; the lighting is done by electricity with drop-lights and receptacles for desk-lights.

Write the specifications so that the building may be economically constructed and will be a paying investment, and yet not so cheaply built that it will be unattractive or constantly needing repairs.

PRACTICAL EXAMPLE: A COLONIAL HOUSE

Conditions. A business man, having purchased a lot sufficiently large to give him space on all sides, wishes to build a colonial house containing nine rooms.

On the first floor, a hall is to be in the center, with vestibule and porch in front and doorway at the rear, so that the air may circulate freely in the summer time. The hall is to be about 15 feet wide. At the front, on the left, opening off this hall, the owner wishes to have a large room about 14 feet by 25 feet. The parlor and dining room are to be about 14 feet by 12 feet each. On the right of the hall, next to the dining room, is to be a china closet, with shelves and drawers, connecting with the kitchen. Beyond the kitchen is to be a pantry, with shelves, cupboards, and cases of drawers. The back entry is to have a place for a refrigerator. The rear door of the front hall is to open on an ample porch, where the family may sit.

The second floor is to have four bedrooms and an alcove in the main part of the house, a convenient bathroom and bedroom in the rear, and suitable linen closets. There are to be a front stairway and a compact back stairway. The attic is to be arranged for sleeping rooms.

Sketches. The drawings first to be made are sketches at a scale of one-eighth inch to the foot, drawn on Whatman's paper, with the plans inked in and the walls shown black. The elevations may be sketched in pencil, merely the front and left-side elevations being shown.

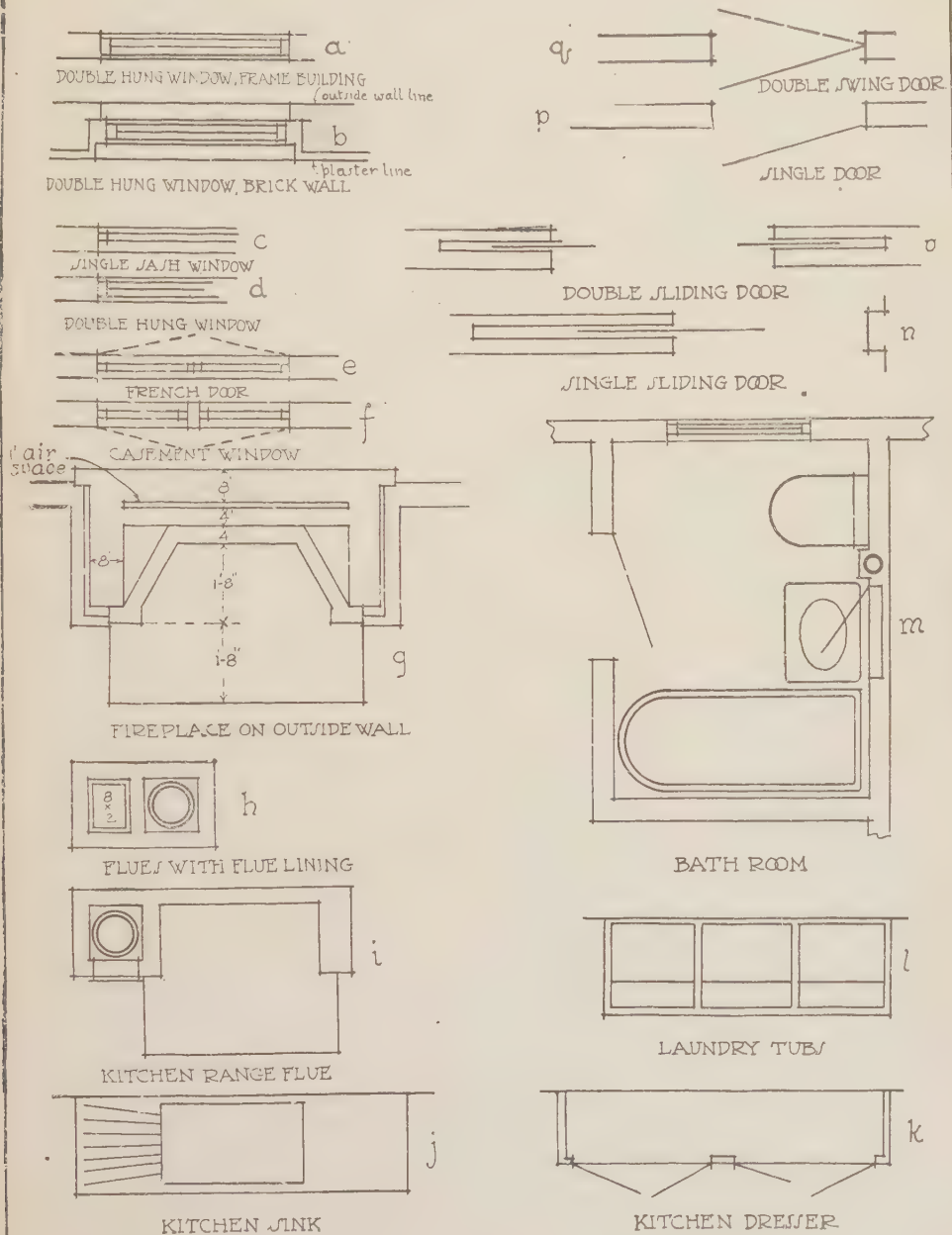
Figs. 28 to 49 show complete working plans of a house fulfilling these conditions—a three-storied frame residence, such as is frequently constructed in our suburban country towns and smaller cities. The drawings include the basement, first floor, second floor, attic, and roof plans, front elevation, and one side elevation, corresponding framing plans, and details of different parts of the house. Details are not always included in the contract drawings, but are made as the work progresses. The rear elevation and one side elevation have been omitted, as they are of the same character as those shown. These plans are usually drawn at the scale of one-quarter inch to the foot; in the illustrations, they are reduced:

Plans. On commencing the quarter-scale, the principal dimensions should be given in feet and inches, not in fractions of an inch, to the outside line of the sill. The main contour lines should be marked first, and then the wall should be shown on the first floor, six inches thick. The sill line is shown on Fig. 29, one inch inside of the outer wall line, and is merely drawn in a little way at the corner of the building. In drawing out the plans in pencil, the lines may be run straight through, taking no notice of openings. The lines that run over can easily be erased later. In commencing to lay out the plan, it is well to draw the center lines or axes first, as all the symmetrical points of the building will be laid out from these axes. Doors and windows either center on an axis, or, as a rule, are equidistant. The bay windows and chimneys are also located if possible on the axis lines. The door and window openings in the exterior walls are not located in plan until the elevations are laid out. When this is done, the sizes of window designed on the elevation can be transferred to the plan. As mentioned previously, in working over the plans, notes should be made for the specifications and marked on the plans; for example—*g. p.* (glass panel); *c. w.* (casement window); *t. l.* (top light or transom light).

Elevations. In laying out the front elevation, the center line should be sketched in sharply, in pencil; and the location of the sill line should be marked at the right and left of this center line. Then the outside finished building line should be drawn one inch outside the sill line, this being the outside of the boarding.

Useful Memoranda. In laying out plans at one-quarter of an inch to the foot, the beginner is often puzzled to know the simplest way

PLAN DETAILS.



Scale of 0 1 2 3 4 5 feet

Fig. 27.

to show ordinary constructive forms; and in tracing plans, which a beginner is likely to be called upon to do, if the original is not very distinct, he will find it useful to have some guide for convenient reference—as, for example, that shown in Fig. 27. The lines in the drawing (*a*) of double-hung windows can all be laid to scale, though very simply expressed. The sill is shown, both outside and inside; and also the sash opening and glass opening. In a brick building, the brickwork and wood furring are shown (*b*). The distinction between single-sash (*c*) and double-hung windows (*d*) will be found convenient. The distinction between a casement window (*f*) and a French window (*e*) is not shown in plan, as the difference lies principally in the fact that the French window is carried to the floor. The casement window, on the other hand, is, in general, slightly different in having a mullion in the center for each sash to strike on. The French window is shown opening out, and the casement window opening in; but these could be made to open either way, and the casement window could be built singly, or in pairs, or in series.

In placing a fireplace (*g*) on the outside wall, an air space should always be left to prevent unnecessary cooling of the flues. The finished brick fireplace should be distinguished from the rough chimney; and, where necessary, flue linings should be shown. A space should be shown separating the furring from the brickwork at least one inch, as prescribed in all good building laws. This applies also to fireplaces on inside walls. The hearth is shown, either the width of the finished fireplace, or sometimes the width of the chimney-breast, and projecting 16, 18, 20 inches, or more into the room.

If the kitchen range is to be brick-set, a similar hearth and chimney-breast must be built (*i*); and in all cases it is advisable to have the kitchen duct circular (*h*), set in a rectangular flue which it keeps warm and which is available for ventilating the kitchen through a register set near the kitchen ceiling. The kitchen sink (*j*) should always be shown with drip-board. A kitchen or pantry dresser (*k*) should be shown with doors opening out—not sliding, unless the space is very limited. Laundry tubs (*l*) should be shown as indicated in the drawing. A bath-tub is indicated as shown (*m*), and other toilet fixtures are indicated similarly. Single (*n*) and double (*o*) sliding doors (inside), single doors (*p*) and double swing doors (*q*) are indicated as shown.

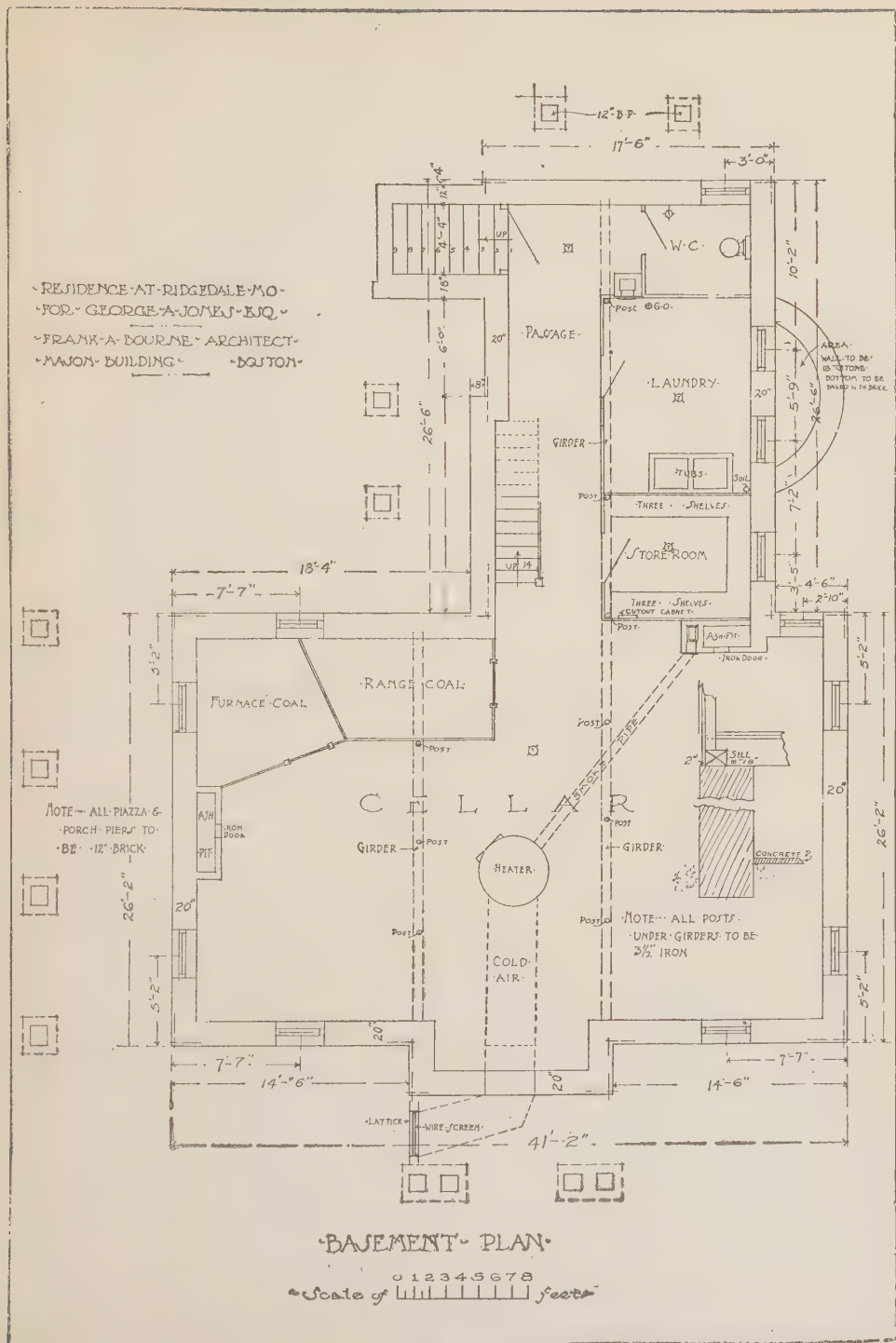


Fig. 28.

Basement Plan. Fig. 28 shows the basement plan of the residence. Dimensions are all given to the outside of the underpinning rubble wall, which in this case is 2 inches outside the sill line, as shown in the half-inch scale section. The footings of piazza piers at the front of the house are shown dotted. On the left side of the piazza is lattice-work covering the opening into the cold-air box for the furnace. The underpinning is of stone 20 inches thick; and the piazza piers are 12 inches square, built of bricks. The posts holding the girders are usually made of iron, three-quarter-inch metal, three and one-half inches in diameter. Sometimes these posts are made of iron about one-quarter inch thick, filled with concrete, the cost being about the same as that of brick piers, with the advantage of taking up less space than the latter in the cellar. The footings of the chimneys are not shown; the ash-pit under the chimney has an iron door for cleaning; and the coal-bins are made with slides, and located conveniently near the furnace and not too far from the kitchen stairs, with the partition so placed that coal can be thrown from the window into either bin. A storeroom is built with shelves, convenient to the cellar stairs. A laundry, with set tubs, is placed in the best lighted part of the cellar. A very desirable item frequently overlooked in planning, is to allow a space at the right-hand end of the laundry tubs for the clothes-basket. The laundry should also have a chimney near the laundry stove. There are also a basement toilet-room and an outside hatchway or rollway. The windows, as a rule, should be located under the windows in the upper story; and as the basement plan is frequently used on the work separately from the other plans, all dimensions should be given, so that no reference to the other plans will be necessary. The window openings may be figured to centers, but they are sometimes figured to the brick or stone opening. The heater, or hot-air furnace, is placed near the center of the cellar. The cold-air box should be arranged so as to take air from the side least affected by the changing winds (south or east). In the case here illustrated, it has been located under the front porch.

First-Floor Plan. This, the most important of all the working drawings (Fig. 29), shows at a glance the main proportions and dimensions of the whole building, besides being the plan of what, in our American manner of living, is the principal story of the house.

This house would be located to the best advantage on a lot facing

the south or southeast. This would put the kitchen on the north, the dining room on the east (which would give it the desirable morning sun), and the parlor on the south and west.

The front porch sheltering the front doorway, and the vestibule and second door, form a protection necessary in cold northern climates. The hall and staircase in the center of the house open into the principal rooms. The living room on the left, 14 by 25 feet, opens by French windows on the piazza. The parlor to the right connects by sliding doors with the dining room. The living room and dining room both have open fireplaces.

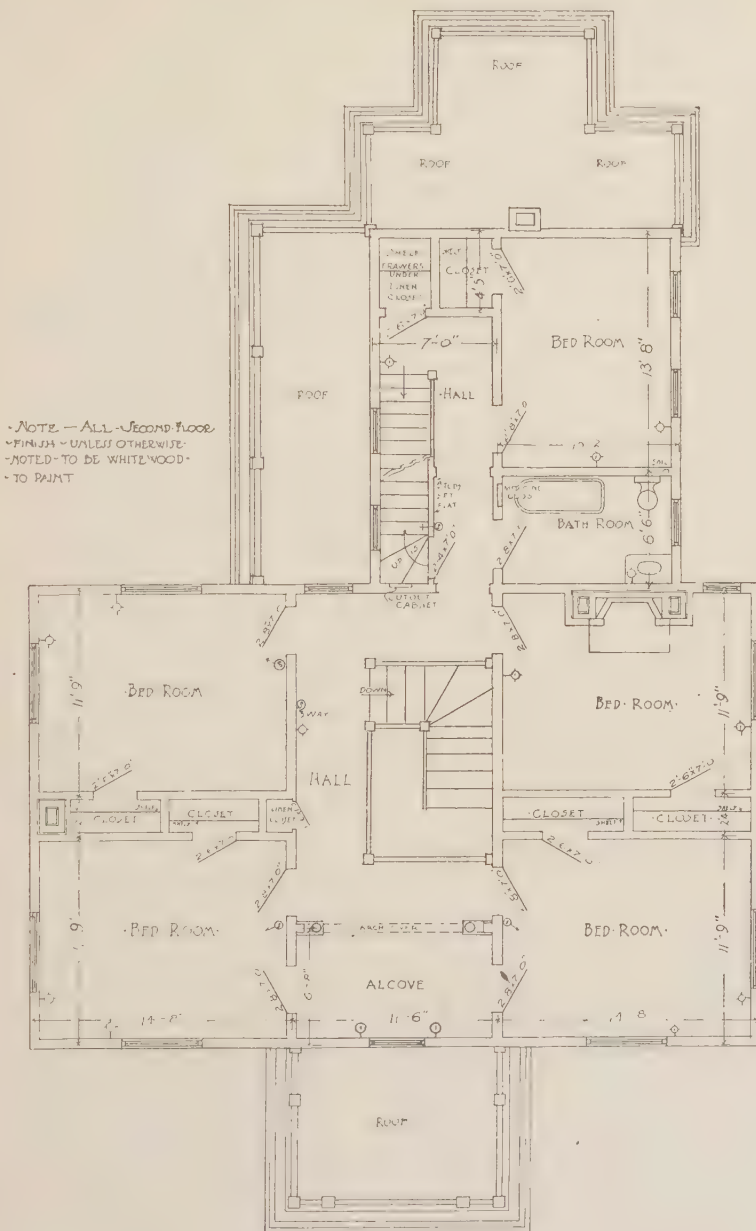
From the rear of the hall a door opens on the rear porch, and another door leads to the passage connecting with the kitchen and the back stairs. Between the dining room and the kitchen is a large china closet, having glazed shelving and also a counter shelf on which is dotted the location for a china-closet sink—which, shown in this way, would not be considered a part of a contract, but could be put in later. From the kitchen a staircase leads down to the basement. The kitchen has windows on both sides, giving a cross-draft for ventilation, which is very agreeable in summer.

In the rear of the kitchen is a pantry, with cupboards, drawers, and shelving. The large back entry is planned for a refrigerator, which has an ice door on the rear, to be put in according to the directions furnished by the refrigerator maker.

This plan should be laid out like all the others, from a center axis, the dimensions being figured to outside of studs for outside walls, and to the center of partitions for inside walls, and to the centers of the window openings.

The sill line is $\frac{7}{8}$ inch inside the outside line of the walls shown, while the inner line representing the plaster surface is $4\frac{3}{4}$ or $4\frac{7}{8}$ inches inside the sill line. The dimensions being given in this way, it is a simple matter for the carpenter on the building to run his measuring stick between the outside studding and against the outside boarding, and to measure across, thus locating the center of an interior partition or the center of one of the windows. The location of gas and electric fixtures is shown by circles on the plans.

Second-Floor Plan. This is shown in Fig. 30. Only those dimensions are given on these plans which are not indicated on the first floor, as all second-floor partitions are supposed to rest on the



NOTE - ALL SECOND FLOOR
FINISH - UNLESS OTHERWISE
NOTED - TO BE WHITEWOOD -
TO PAINT

PLAN OF SECOND FLOOR

Scale of 0 1 2 3 4 5 6 7 8 9 feet

Fig. 30.

partitions below, if possible. The roofs of the porch and piazza are shown. These may be covered with painted canvas or with tin, and, if they are to be much used, should be provided also with a floor of wood slats. The staircase and hall are shown with an alcove opening toward the front, lighted from the window over the front porch. This alcove is separated from the hall by an arch resting on small columns, making an attractive sitting room. There are doors from it into the adjacent bedrooms. Instead of the arched opening, a partition may be put in, making a convenient dressing room. The bedrooms are 11 by 14 feet, and are provided with closets.

One bedroom has a fireplace, and the two bedrooms on the left of the house have access to a chimney. There is a small linen closet, provided with wide shelves, opening out of the hall. Sometimes the lower part of this closet is provided with drawers, and the upper part with wide lockers having drop fronts. The opening between the front hall and the rear hall can be closed with a door, if desired; or the door can be placed opposite the partition between the bathroom and the rear bedroom. The bathroom comes directly over the butler's pantry, so that the plumbing is all very compactly arranged. The staircase to the attic goes up over the back stairs that lead down to the kitchen. The rear bedroom, which could be used as a servants' room, is provided with a large closet. A large linen closet, with shelves and drawers, opens into the rear hall.

Attic and Roof Plan. The attic, as shown in Fig. 31, is left unfinished, with the exception of the hall at the top of the back stairs. The location of the tank is shown near a chimney, and a small closet opens off the hall. The roof lines are shown by dot-and-dash lines, which are frequently drawn in red on the working drawings. The frame line (*i. e.*, the line of the outside of the sill and the studding)—which should appear on all the working drawings—is shown here in full, with all dimensions noted thereon.

Front and Side Elevations. As shown in Figs. 32 and 33, the character of the house is "Colonial," of about the period of the beginning of the nineteenth century. The treatment is very simple and the details should be worked out delicately to obtain the Colonial character. The construction is comparatively simple, the base being of brick, sometimes with a granite course at grade, and sometimes the whole underpinning being of split granite. The wall is covered with

RESIDENCE AT RIDGEDALE, NO.
 FOR GEORGE A. JONES, ESQ.
 FRANK A. BOURNE, ARCHITECT.
 VAON BUILDING, BOSTON.

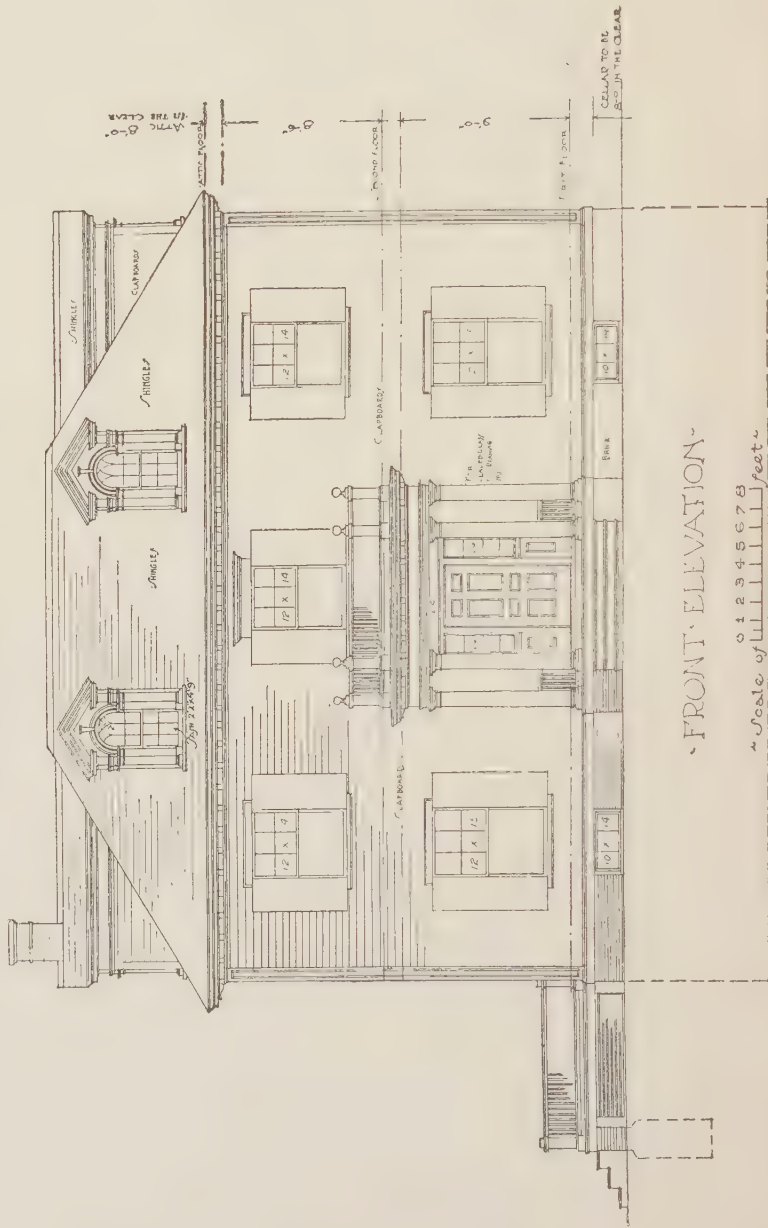


Fig. 32.

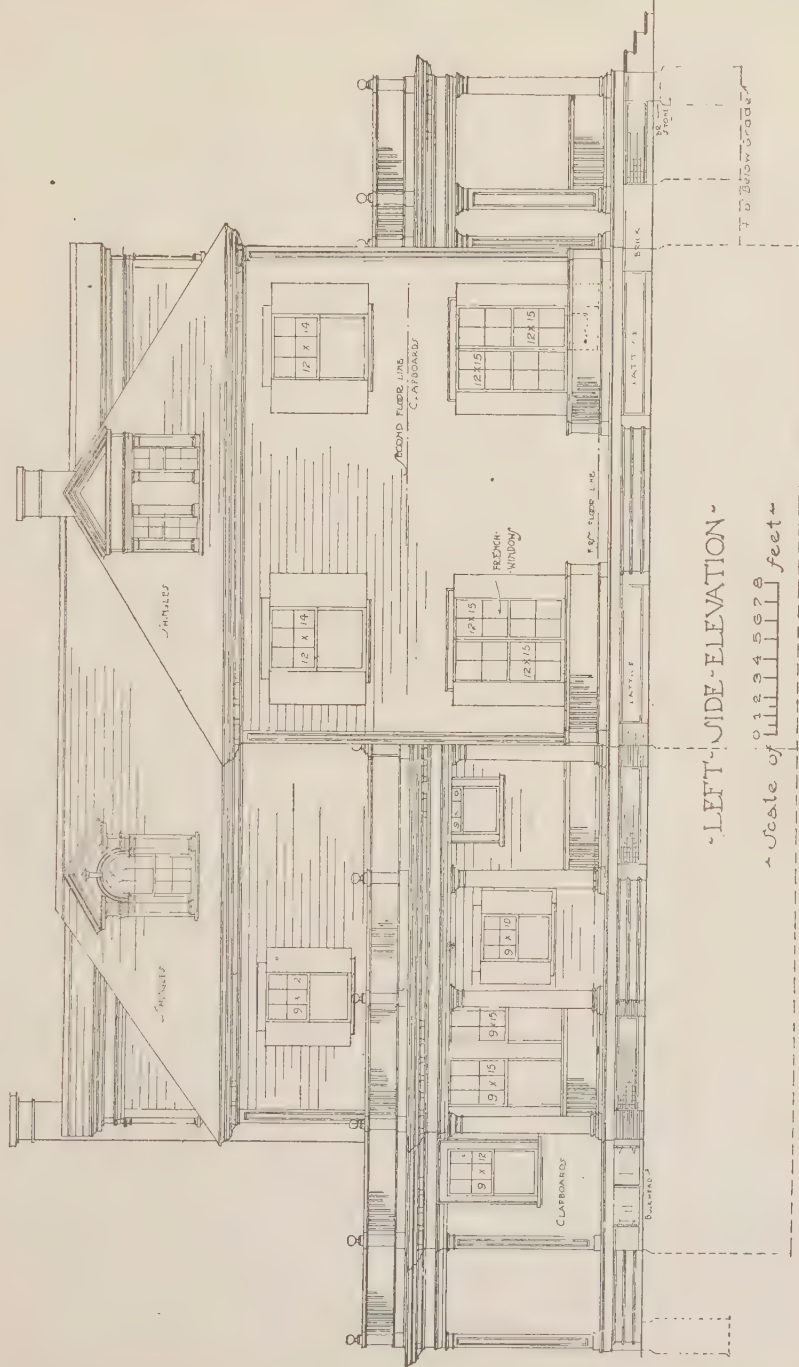


Fig. 33.

• RESIDENCE • AT • RIDGEDALE • MISSOURI • FOR •
GEORGE • A • JONES • • ENQUIRE •

• Frank A. Bourne • Architect • Mason Building • Boston •



DETAIL • OF • FRONT • ELEVATION •

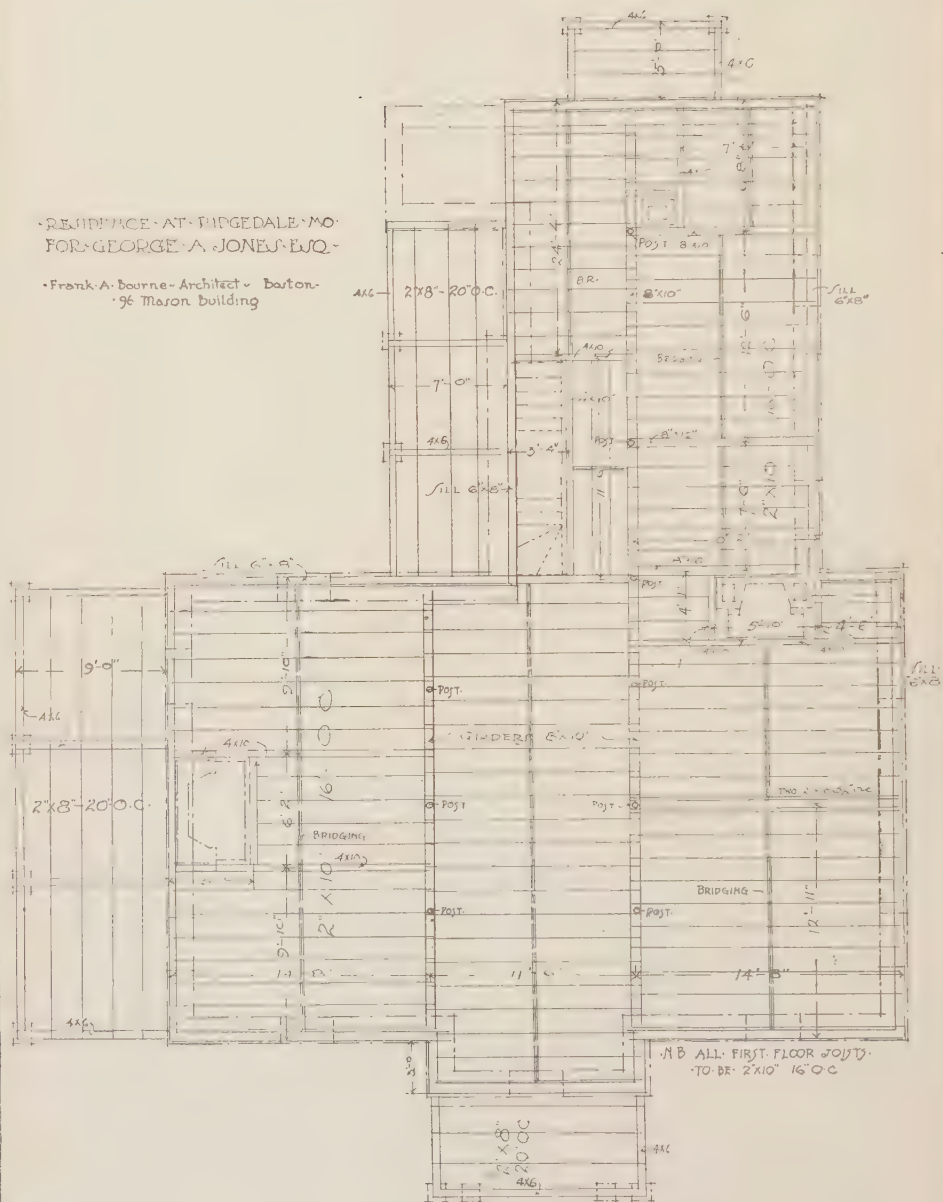
• Scale of  feet •

clapboards, with cypress or pine finish. The roof is covered with shingles. The location of the floors is shown by a dot-and-dash line, which in working drawings is frequently put in in red ink. The height of the floors is 9 feet for the first story, 8 feet 6 inches for the second story, with an attic 8 feet in the clear. The cellar is to be 8 feet high in the clear.

Detail of Front Elevation. Fig. 34, showing detail of the front elevation, is reduced from a drawing made at a scale of one-half inch to the foot. This is sufficiently large to show very clearly to the workmen the relation and character of the mouldings, which must, of course, be worked out at full size. The cornice and the front entrance are here shown, the cornice consisting of the Roman Doric Order, as treated in the Colonial period, the column having a modified Attic base, and a shaft with the customary entasis. This entasis or swelling of the column extends one-third of its height without diminution and tapers slightly until it comes to the necking. The cap is very simple, consisting of astragal, necking, fillet, and echinus, all turned; a square abacus, consisting of a fascia, ogee, and fillet. The architrave consists of a fascia, small bead, another fascia, ogee, and fillet. The frieze in this type of building is usually plain; and the cornice, which may be greatly varied, consists, in this case, of a great quarter-hollow, fillet, quarter-round, fascia with brackets, and a corona consisting of fascia, fillet, and cyma. Between the columns is a balustrade with turned balusters. The cornice is surmounted by another balustrade with posts, top and bottom rail, and turned balusters. The doorway is worked out in old Colonial style, with paneling peculiar to that period. The sash may be made either according to the design shown, in wood, or with wide leads, which may be painted white. Windows are shown with outside casing and back band; and the center window has a small cap to accent the central portion of the house. The water-table is formed to take up the slight projections of the brick underpinning beyond the outside boarding. It consists of a wide fascia, an astragal, and a splayed member. The corner is paneled, as shown. Sometimes a plain corner-board is employed, and at other times it is made larger and finished with a Classic capital and base. The cornice of the house is similar to the cornice of the porch, the frieze and architrave being omitted, as is quite customary on Colonial houses, although there are examples of Colonial houses where the complete en-

• RESIDENCE AT RIDGEDALE MO.
FOR GEORGE A. JONES ESQ. •

• Frank A. Bourne - Architect - Boston -
96 Mason Building •



• FRAMING PLAN OF FIRST FLOOR •

Scale 0 1 2 3 4 5 6 7 feet

Fig. 35.

tablature is used. The dormer shows a peculiar Colonial treatment, using a small Doric Order on each side of the arched window. The muntins of the sash are generally worked out in wood. At the side of the roof is shown a side elevation of the dormer.

First-Floor Framing Plan. (Fig. 35.) The supports shown with a dot-and-dash line would usually be shown in red ink in the working drawings. The sill, 6 by 8 inches, laid flat, is shown with a full line running all around the building. The girders and the posts on which they rest are shown in a full line, the girders being 8 inches by 10 inches, and the posts not over 10 feet apart. The piazza girders are 4 by 6, and the piazza sills are 4 by 6. The piazza floor joists are 2 by 8 inches, 20 inches on center. The dimensions are given to the outside of the sill, and to the centers of the partitions. Where the partitions come over each other and are parallel to the joists, a joist is set 1 inch each side of the studs of the partition, so that the rough floor boards may run directly through and leave room for nailing for the finished floor each side of the partitions. Trimmers and headers are double the size of their respective floor joists, being 4 by 10 inches in this case. All joists are set 2 inches clear of the fireplace openings. The distances are given to the centers of the trimmers, but sometimes dimensions are given for the clear opening. All the first-floor joists are to be 2 by 10, placed 16 inches on centers. The bridging is shown dotted. This is made of 1 by 2½-inch stock set diagonally between the joists.

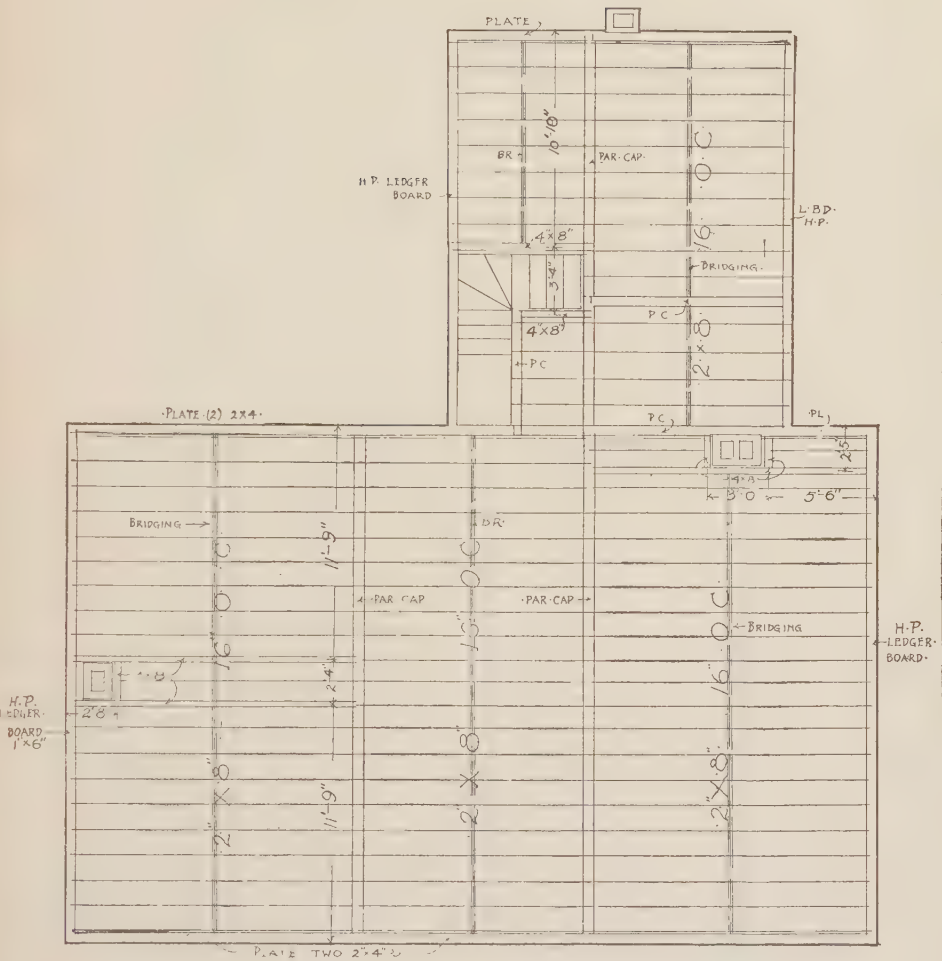
It will be noticed that all the 2-inch joists except those in special locations—for example, under a partition, as above mentioned—are shown with only a single line, all other timbers being shown with a double line.

Second-Floor Framing Plan. The second-floor framing plan (Fig. 36) is similar to the first-floor, the girts, 4 by 6 inches, being shown instead of the sill. The framing of the roofs of the porches is shown, and notes are made where the girts are flush or where they are sunk. In certain cases it will be noticed that the joists are carried through, continuous. It often happens that shorter stock might have been used at no disadvantage to the building. The joists across the building should be nailed together wherever possible, so as to make a complete tie across the building.

Attic Framing Plan. On this drawing (Fig. 37), the roof plate is shown, and also the location of the hard pine ledger-board. The



Fig. 36.

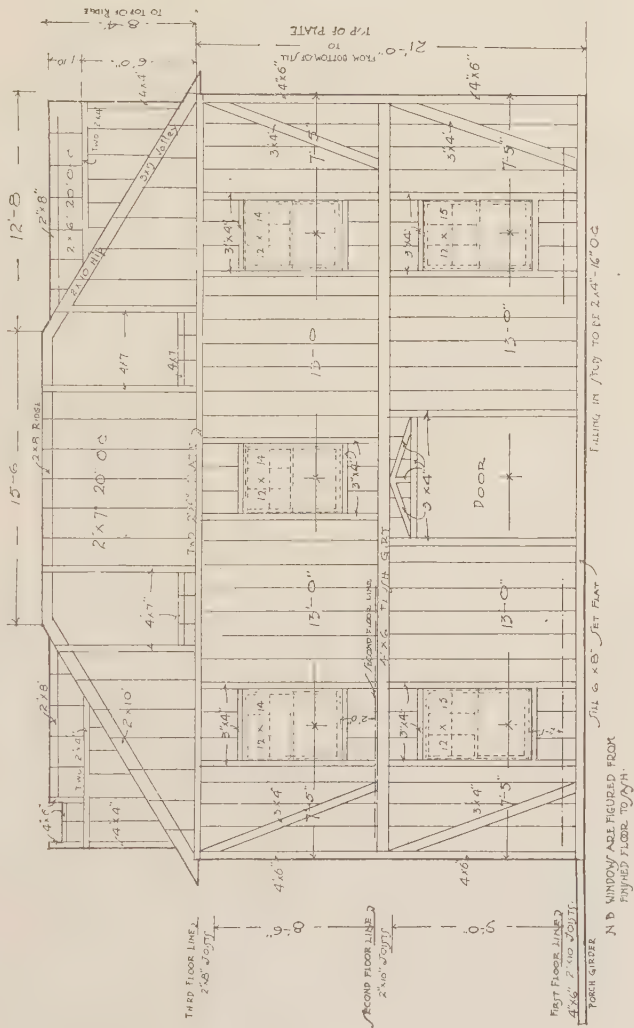


•FRAMING-PLAN-OF-THIRD-FLOOR•

Scale of 0 1 2 3 4 5 6 7 8 feet

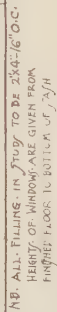
Fig. 37.

Frank A. Bourne, Architect. Mason, Building
Boston



Scale of _____ feet

Fig. 39.



6" x 8" JILL SET FLAT.

Scale of $\frac{1}{1}$

0	1	2	3	4	5	6	7	8	9
---	---	---	---	---	---	---	---	---	---

Fig. 40

partition caps of the story below, on which the joists rest, are shown. The joists in the attic floor are 2 by 8, placed 16 inches on centers.

Roof Framing Plan. The rafters and hips are shown (Fig. 38) 2 by 10; the valley rafters, 3 by 9; the ridge, 2 by 8 inches. The rafters either side of the dormer openings are 4 by 7, and the headers for the dormers are also 4 by 7 inches. All the other main rafters are 2 by 7 inches, placed 20 inches on centers; and the dormer rafters, 2 by 6, placed 20 inches on centers. The plate line, which is the same as the first-floor sill line, is shown as a full line, and the dimensions are given from this line.

Framing of Front Elevation. The framing of the front elevation of the house above the foundation is shown in Fig. 39. The sill is 6 by 8, resting on its 8-inch face. The corner posts are 4 by 6, framed into the sill; and a 4 by 6 flush girt is shown running around the house. It will be noticed that the girt stops on the side elevations where it is marked "4 by 6 sunk girt" (Fig. 40). The plate is formed of 2 by 4 joists, which break joints all around the building. The frame is braced by 3 by 4 studs, these braces being as long as possible, which is considered better construction than the former short-brace system. In cheaper work, 2 by 4 braces, halved into the studding, are sometimes used in the same position. The filling-in studs are 2 by 4, set 16 inches on centers. The door and window studs are 3 by 4 inches, set 5 inches clear of the sash opening.

The dimensions are given to the centers of the openings. The heights are generally given to the finished floor, which would be 2 inches above the joist line. The large openings are trussed, as shown over the front door opening. The rafters are 2 by 7, set 20 inches on centers, the hips being 2 by 10, and the valley rafters 3 by 4. The dormers are built up of 4 by 4 corner posts and 4 by 7 rafters each side of the opening. The ridge is 2 by 8, the distance to the top of ridge being given above the top of the plate, and all the points on the ridge rafters and ridge may be located on the sill line to the junction of the hip.

Framing of Side Elevation. The sill, girts, corner posts, studding, plate, and rafters (Fig. 40), are similar to those already described on the front elevation. The framing of the front and rear porches is also shown, with the dimensions given similarly. The attic floor joists

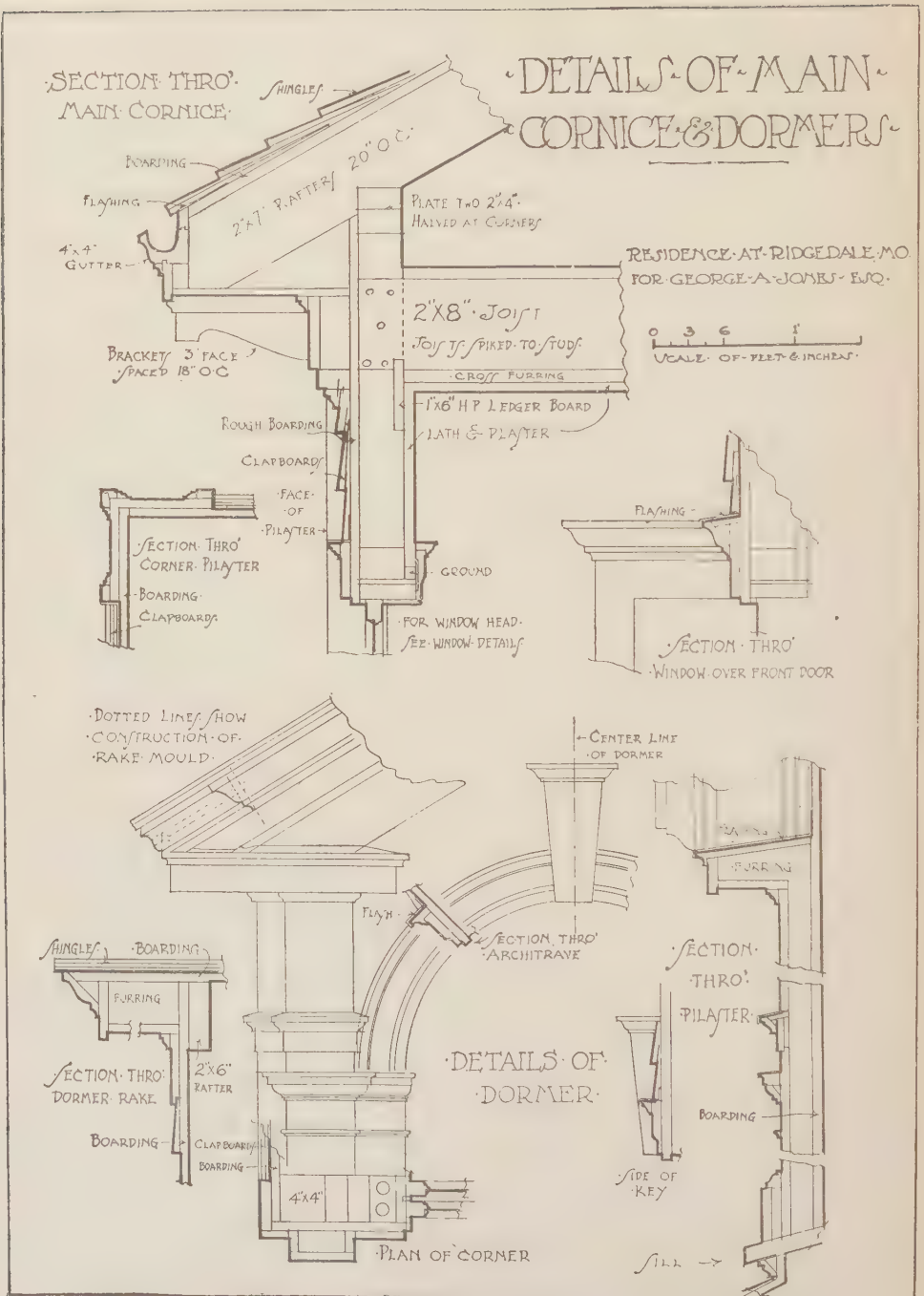
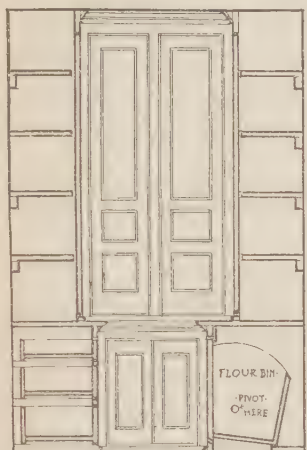


Fig. 41.

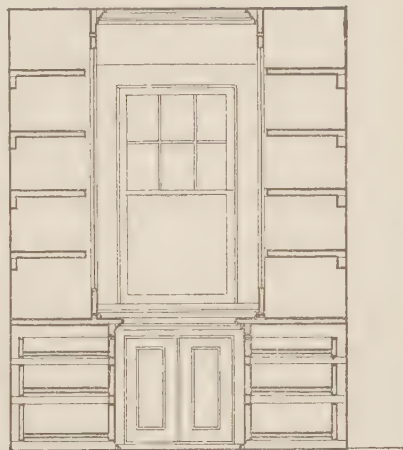
~DETAILS~OF~KITCHEN~PANTRY~ETC~

~RESIDENCE~AT~RIDGEDALE~MO~

~FOR~GEORGE~A~JONES~ESQ~

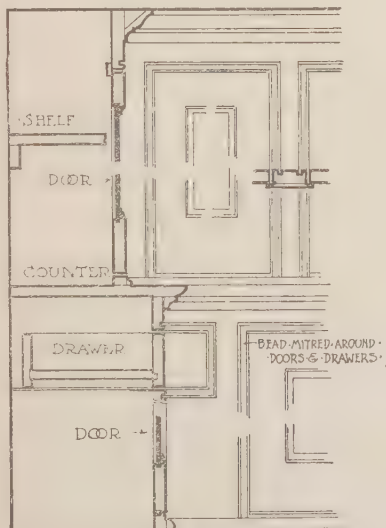


SECTION THRO' KITCHEN PANTRY

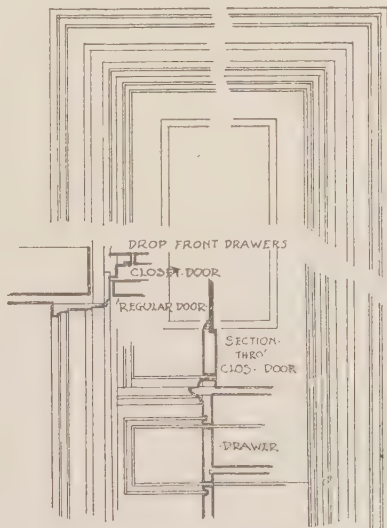


SECTION THRO' CHINA CLOSET

SCALE
12 6 0 1 2 3 FEET.



~DETAIL~OF~PANTRIES~



~DETAIL~OF~LINEN~CLOSET~

SCALE
12 9 6 3 0 1 FOOT.

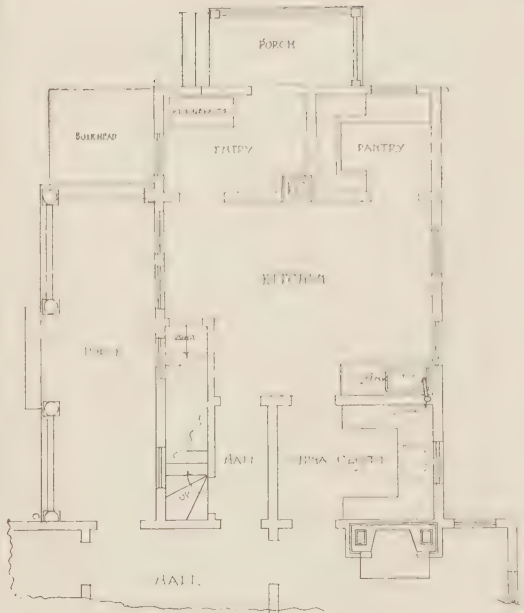
PLUMBING PLANS & SECTION

RESIDENCE - AT RIDGEDALE - NO -

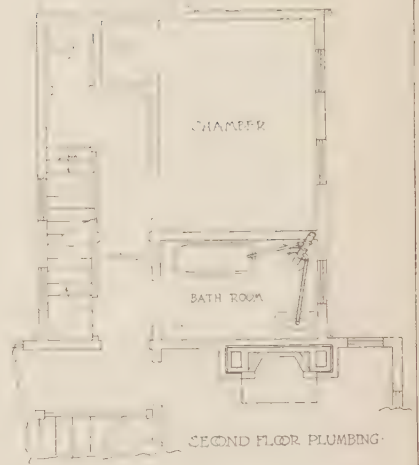
FOR - GLOBE ARCHITECTS - 2-10

FRANK HODGKINS ARCHITECT

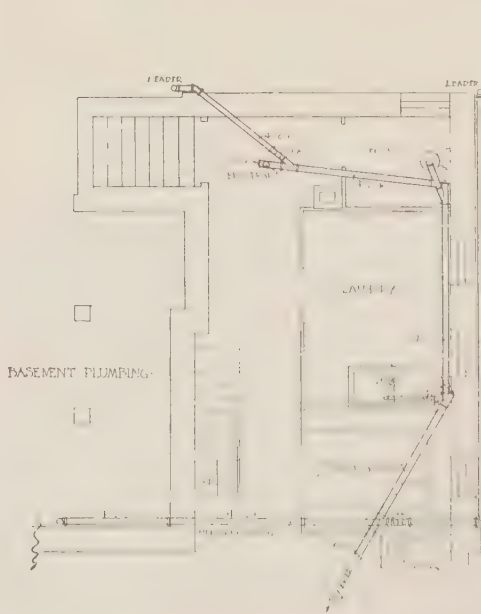
MAJOR BUILDING BOTTOM



FIRST FLOOR PLUMBING PLAN



SECOND FLOOR PLUMBING



BASEMENT PLUMBING

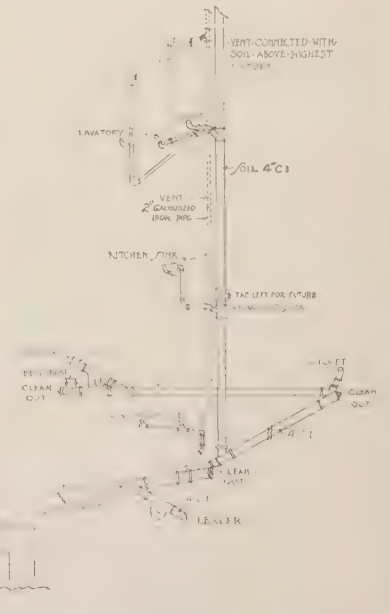


Fig 43.

are supported on a 1 by 6 hard pine ledger-board, which is cut into the studding after the manner of balloon framing.

Main Cornice and Dormer. Fig. 41 is reduced from a drawing made at a scale of three-fourths inch to the foot. This plate should be drawn out at the original scale mentioned; and a full-size pencil study should be made for comparison.

Kitchen, Pantry, and China Closet. Fig. 42 shows the details of kitchen, pantry, and china closet reduced from a drawing made at a scale of one-half inch to the foot, and larger details at a scale of one and one-half inches to the foot, showing shelving, lockers, and doors. These are all included in the interior finish, and should follow the specifications as to sizes. The mouldings should all be full-size.

Plumbing. Fig. 43 shows the plumbing details for this building. These details are carried somewhat further than is usually done on plans, but no further than advisable, as they will be found of great assistance in carrying out and superintending the work. The basement plan shows the direction of the sewer connection, which is a horizontal pipe, six inches in diameter, of cast iron, located either on the basement ceiling or in a trench on the cellar floor. In this case it must be below the cellar-floor level in order to take the laundry tubs. The section shows the elevations of the pipe carried up through the house.



Fig. 41.

There will be a trap between the point shown and the sewer, just outside the wall of the house. The leader connections are 4-inch cast-iron pipe inside the house in cellar floor, and 4-inch terra-cotta outside the house, to take the water from the gutters and conductors. On the first connection there is a cleanout, and the size of the pipe is reduced from 6 inches to 4 inches. There should be cleanouts at every bend, and also at about every fifteen feet of horizontal run. There should be a bell trap (Fig. 44) to take the cellar surface water, also branches for general fixtures through the house, as shown. The vertical pipe of 4-inch cast iron would rest on a brick pier at the bottom built by the mason.

The vent pipes from the trap of every fixture are shown in dotted lines, and are carried up beyond the highest fixture, where they may be

DETAIL OF GENERAL WINDOW FRAMES.

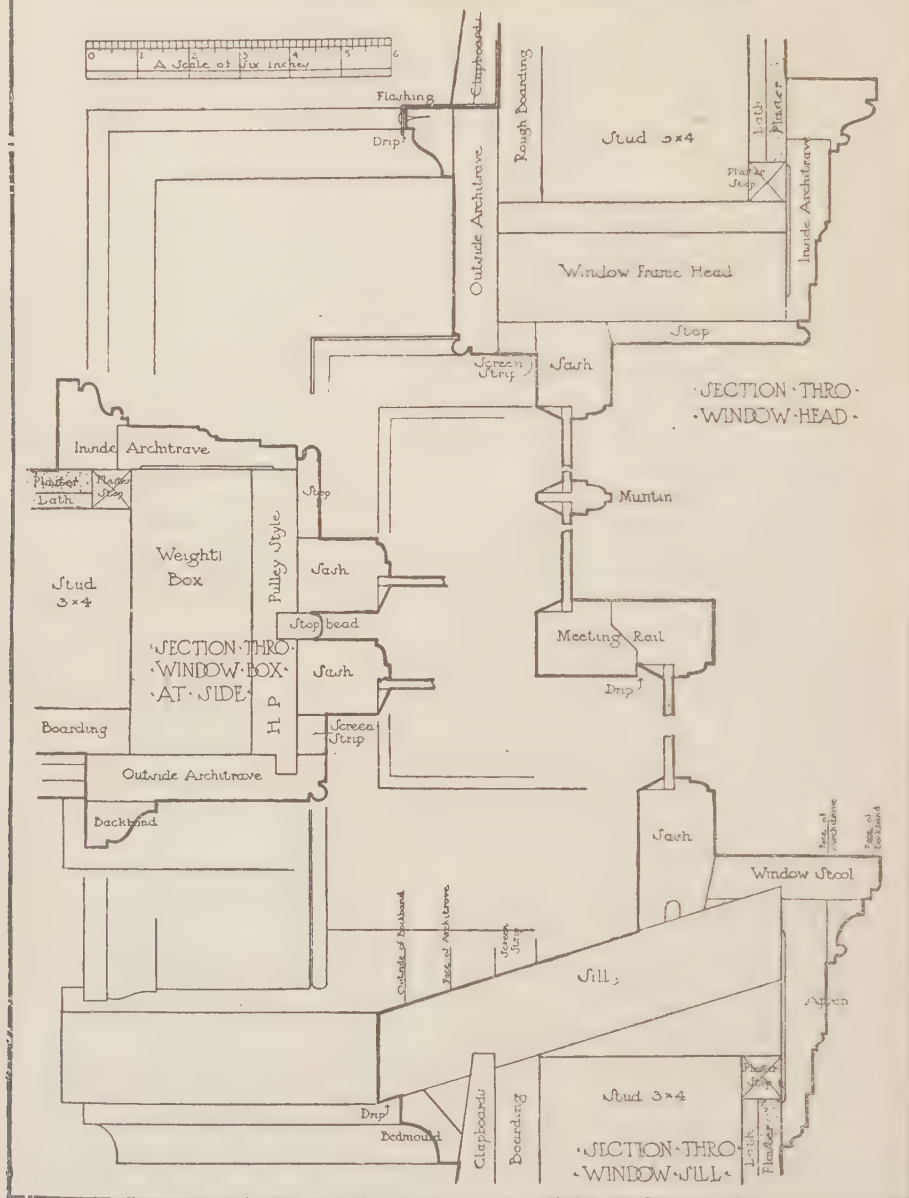


Fig. 15.

carried back into the soil pipe or through the roof. Branches are taken off for the laundry tubs, china closet, sink, lavatory, tub, and closet, as shown in the section and on the first and second-floor plumbing plans. Sometimes these pipes are shown in blue on the regular working drawings; but there is an advantage in having them on a separate sheet, as has been done in this detail. The vent pipes from the traps may be of 2-inch cast iron or of 2-inch galvanized wrought iron. This practice varies with the building laws in different localities.

Detail of General Window Frames. Fig. 45 shows the method of laying out a full-size detail of a window box. Such a drawing is one of the first things usually given to a draftsman on entering an architect's office, and one of the most important details of house building to become acquainted with. The drawing shows an elevation of the lower left-hand corner and upper left-hand corner of the window-frames seen from the outside. The lower part of the drawing shows a section through the window sill. Taking the scale of 6 inches shown at the top of the drawing, it would be found that the window sill can be made from 2-inch stock finished about one and three-quarters inches thick. On the outside, next to the clapboards, is a bed-moulding, and the slope of the sill forms a good drip to throw off water. The clapboards are housed into the under side of the sill. The sill rests on a 3 by 4 or 4 by 4 horizontal stud under the window opening. The inner side of the sill is cut to come on a line with the finished plaster. The plaster stop or ground, which is either three-quarters or seven-eighths inch thick, according to the proposed thickness of the plaster, is nailed on to the 3 by 4 stud. The space between the stud and the sill is frequently filled with mortar. At the left of the drawing is shown a section through the side of the window box.

The outside architrave is arranged on the outside of the boarding; and a back band, or moulded strip, forms a finish around the outside edge. The layers of paper are generally run on the boarding under this outside architrave; and sometimes zinc flashing is used in very exposed positions, being turned up against the outside architrave. The small three-quarter round bead shown in the drawing may be omitted. The 3 by 4 stud is set so as to leave space for the weights. It is a good rule to remember that the distance from the stud to the glass opening is 5 inches, and the distance from the sill stud the same. The distance from stud at window head to glass opening is 4 inches.

The pulley stile is of hard pine; and the parting strip, or stop-bead between the two sashes, is also hard pine. Between the outside architrave and the sash is put in a small screen strip, to give space enough for a mosquito screen between blinds and sash. On the inside of the sash is a stop-bead, which forms a part of the interior finish and covers the rough part of the window frame.

The upper part of the drawing shows a section through the window head. Sometimes the window frame head is made of thinner stock than that shown. This completes the rough window box as it is shipped from the sash factory to the building. At the building, it is nailed in place against the rough boarding; and later the sash, which come a little too large for their position, are fitted into place. Sections horizontally and vertically are shown through the sash, including meeting rail and muntins. The sash at the sill is wider than elsewhere, and underneath is usually beveled where it comes against the finished window stool, so that it will shut tight. There is also usually a groove underneath, to intercept any water that may blow in. The meeting-rail may be made on the outside sash, to drop below the meeting-rail on the inside sash, forming a drip which will prevent the water washing down on the glass of the lower sash.

The inside finish is frequently included on the general interior-finish drawings of the building, and is not always sent out with the window-frame details. The window stool is shown on the drawing, with a small space underneath where it comes against the sash, which forms a slight interruption for any water that may pass the other groove. The apron is nailed onto the sill and plaster stop; and a moulding is generally run under the window stool where it joins the apron. A back band may be laid around the inside architrave, against the plastering; or the inside architrave may be all one piece.

Fig. 46 shows **several** variations from the details of window frames illustrated in Fig. 45; and these can be still further varied if desired; or a combination of the parts may be made, taking certain details from each detail given.

The frames, unless otherwise shown, are usually made of white pine. Pulley stiles and parting beads are made of hard pine.

The pulley stiles are seven-eighths inch thick, tongued into the outside casings, as shown in the section through the side of the window box. The parting or stop beads are seven-eighths by one-half inch in

ALTERNATE DETAIL OF WINDOW FRAMES

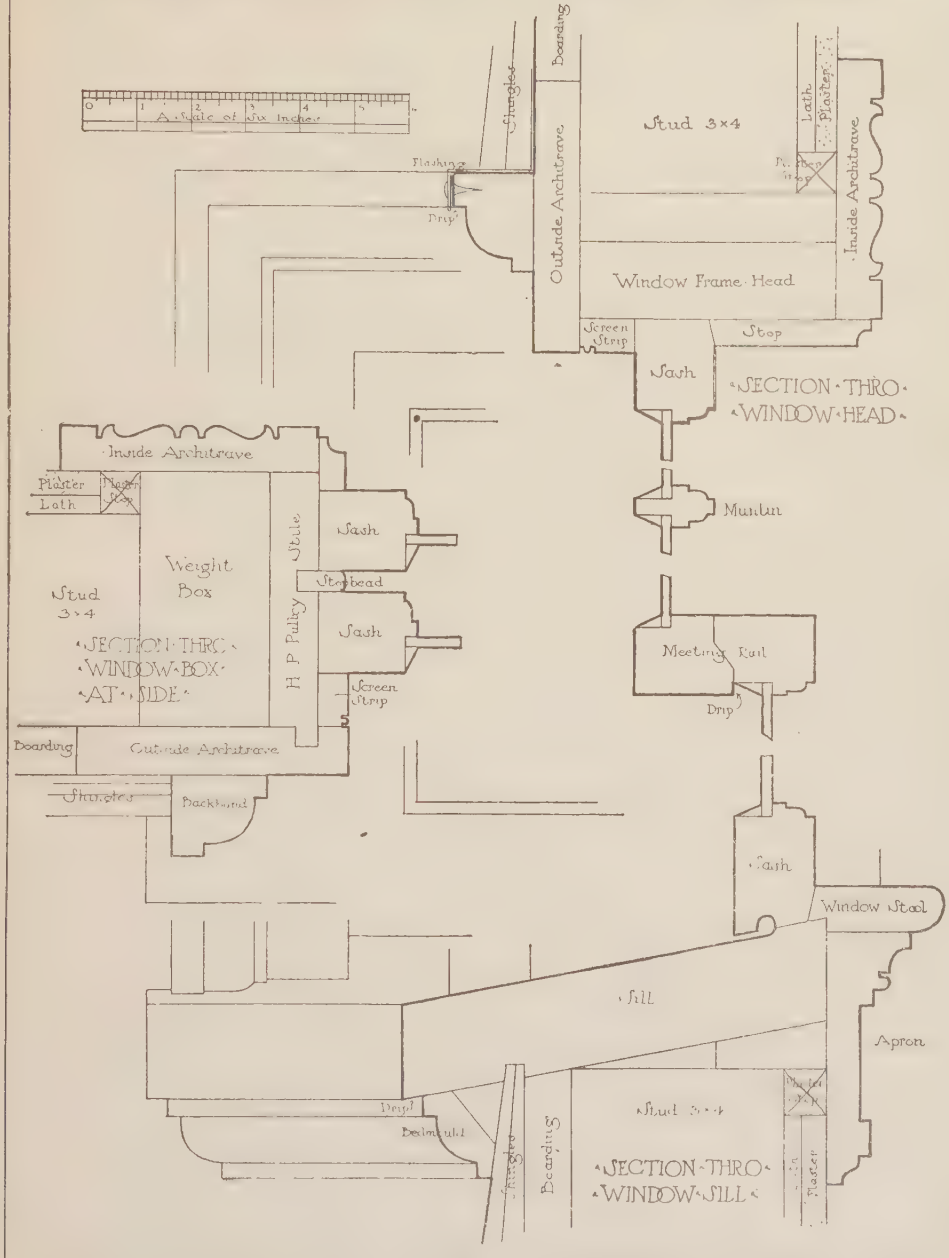


Fig. 46.

size; sometimes they are made seven-eighths by three-eighths inch, the latter giving more room for the screen strip.

When two-coat work is specified for plaster, the plaster stops are generally three-quarters inch thick; when three-coat work is used, generally seven-eighths inch thick. Very often the window box is completed by ground-casing either three-quarters or seven-eighths inch thick, as shown in Fig. 47; in this case no ground or plaster stops are necessary around the window frames. The yoke or window-frame

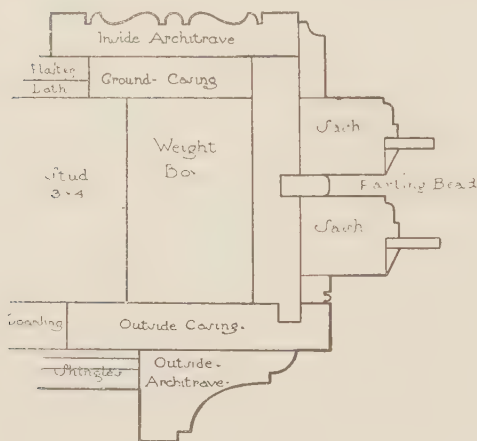


Fig. 47.

head is generally made one and three-eighths or one and one-half inches thick. The sills are set to pitch one and one-half inches. Care must be taken to see that the blinds are made sufficiently long to fit, as stock frames are frequently made with a slope of not over one-half inch in four inches. The outside casing—or outside architrave, as it

is sometimes called—may be set either flush with the boarding or outside the boarding. When it is set flush with the boarding, the shingles may be carried directly across the joint, and finished against a back band, which comes around the outside of the window frame. The outside casing is generally seven-eighths inch thick, and five inches or sometimes four and one-half inches in width. In certain cases it is made of one and one-eighth inch stock, when it is to be set outside the boarding. Sometimes, instead of the back-band shown, an architrave made from one and one-eighth to one and three-quarter inch stock is planted on the outside casing. This would show the distinction between the outside casing and the outside architrave. The method of using a ground casing and outside casing flush with the boarding is inexpensive, and therefore in quite common use. It does not give sufficient room for a screen strip, and does not make a very tight casing where the pulley stile connects with the sill.

DETAILS OF PORCH CORNICE ETC

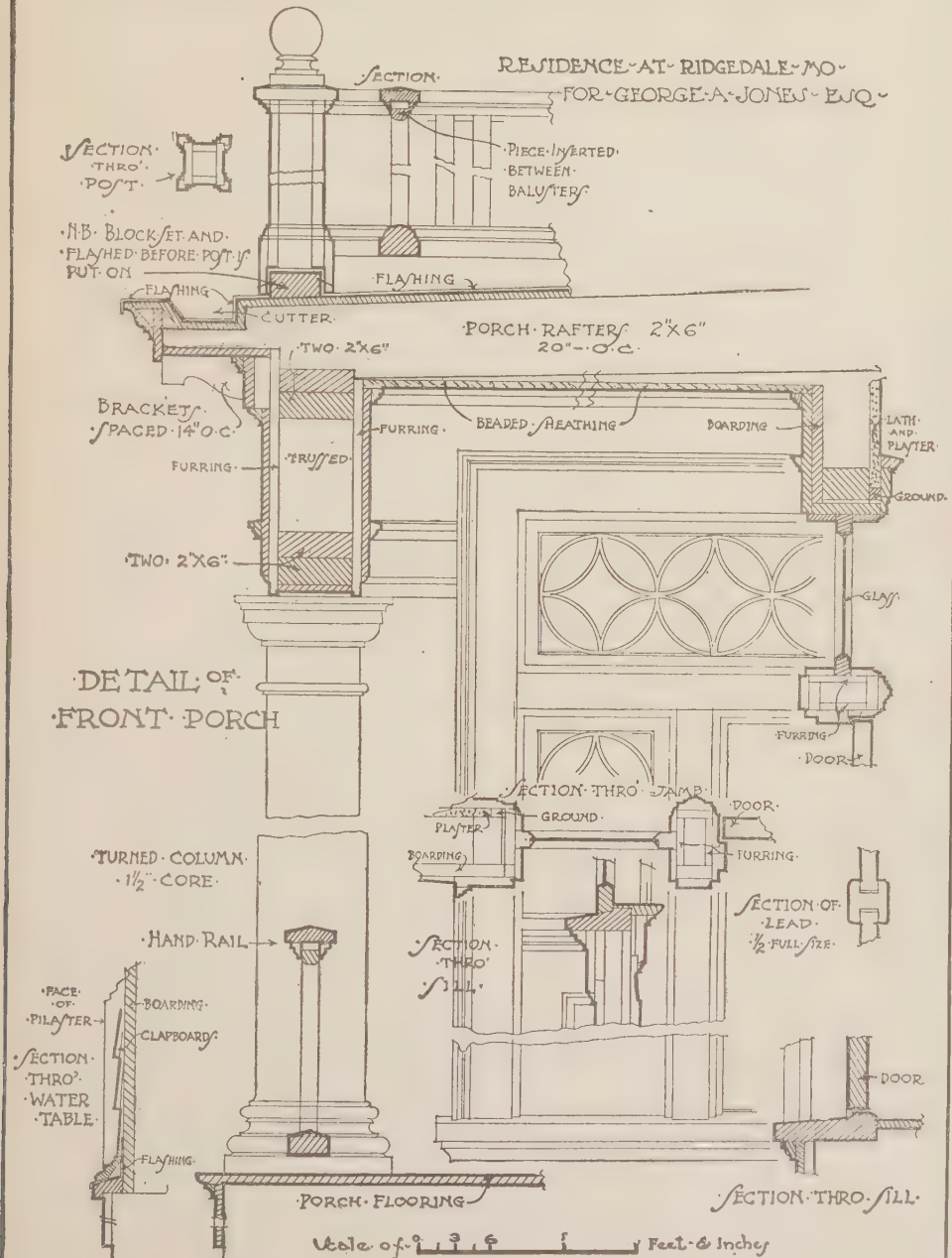
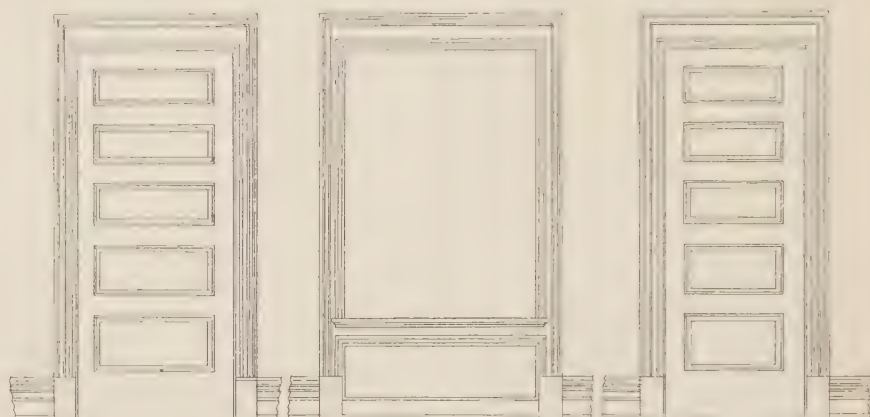


Fig. 48.

DETAILS OF TRIM ON FIRST FLOOR

RESIDENCE AT RIDGEDALE MO.
FOR GEORGE A. JONES ESQ.



DOOR

WINDOW

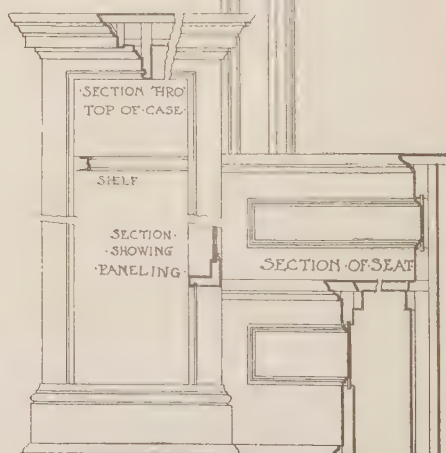
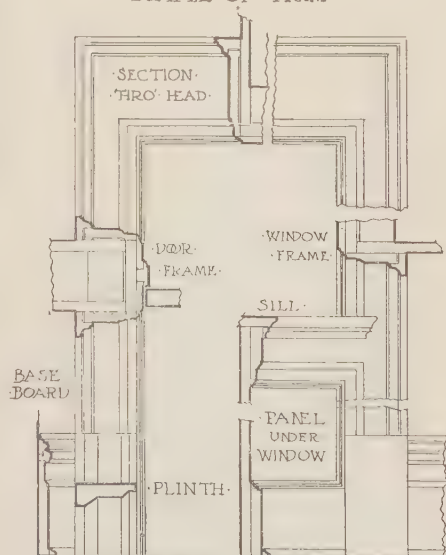
DOOR

SCALE FOR ELEVATIONS: 0 1 2 3

0 6 9 12 SCALE FOR DETAILS

DETAIL OF TRIM

DETAIL OF BOOKCASE
SHOWING
WINDOW SEAT



Scale of 0 3 6 1 Feet & Inches

Fig. 49.

The sash are usually made one and three-quarters inches thick, for house construction; sometimes, in less expensive work, they are made one and one-half inches thick, and, for cheap cellar windows, one and one-quarter inches thick. For plate glass they should not be less than one and three-quarter inches thick; and for important work, they are usually two and one-quarter inches thick. Frames may be veneered on the inside, to match the other interior finish.

Porch and Front Entrance. For detail of these, see Fig. 48.

Trim on First Floor. For detail, see Fig. 49.

Uniform Titles for Drawings. Fig. 50 shows a scheme for a uniform title to be use on working drawings. This may be made as a rubber stamp, the name of the drawing being lettered in, the name of the

DRAWN	BASEMENT PLAN SCALE 1/4" INCH = 1 FOOT	BUILDING NO.
TRACED	RESIDENCE FOR GEORGE A. JONES, ESQ. BOSTON, MASS.	SHEET NO.
CHECKED	FRANK A. BOURNE ARCHITECT	DATE
APPROVED	96 MASON BLDG. BOSTON	REVISED

Fig. 50.

building being set up in rubber type, and the remainder being permanent. This stamp should be put on the drawing whenever it is started, a rubber dating stamp being used to give the date of beginning; the building number and sheet number should be recorded in the drawing book. The architect or draftsman who lays out the drawing puts his initials under the word "Drawn;" the draftsman who finishes it puts his initials under the word "Traced;" another puts his initials under the word "Checked," with the date; and finally the architect adds his initials and date after the drawings are ready to go out of the office. On the lower right-hand corner is a space where date of any revision may be entered. This stamp may be made four and seven-eighths inches long, so that it can be used on a 3 by 5 index card, for the drawing record; and also on a postal card, for a receipt to be signed by the con-

STAIRCASE & FIREPLACE DETAILS

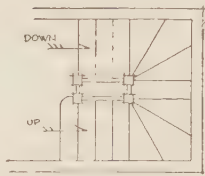


FIG. A

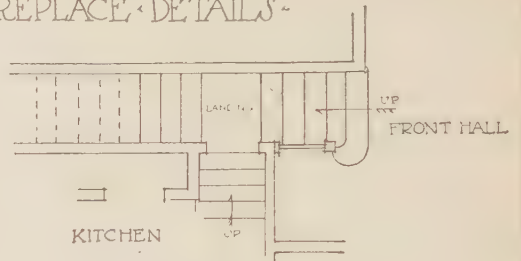


FIG. B

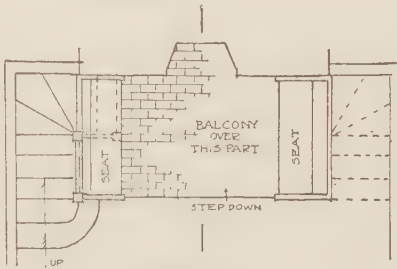


FIG. C

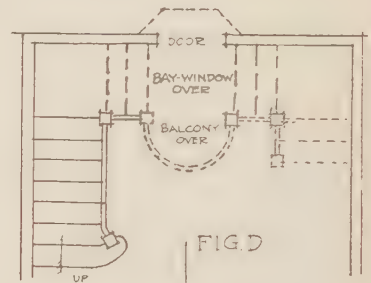


FIG. D

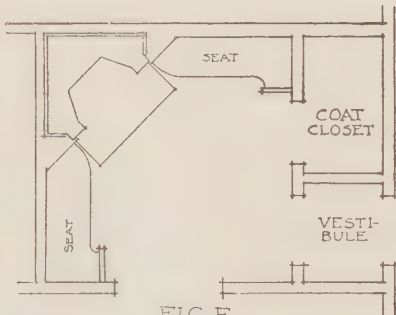


FIG. E

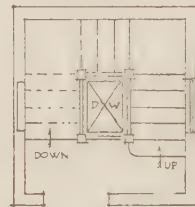


FIG. F

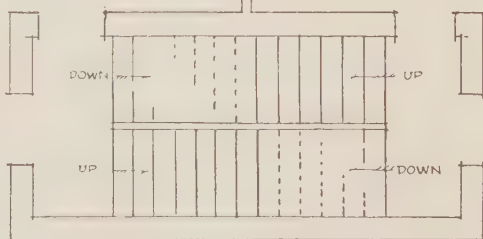


FIG. G

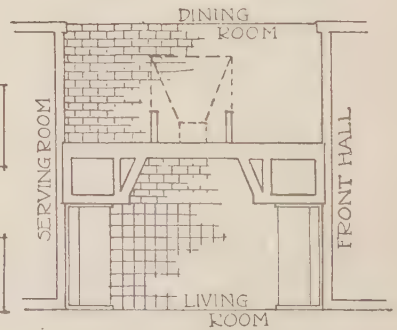


FIG. H

tractor on receiving the drawing, or for any other memoranda in regard to drawings.

Staircase and Fireplace Details. One of the best ways to prepare for the designing of buildings is to study and make memoranda of interesting plans and details. This is especially true in relation to house building, as well as to the planning of large buildings. Some of the most interesting sketch books are those filled with small-plan details which can be referred to and used in the same manner as window or door details could be used in designing elevations. Fig. 51 shows several such small drawings on one sheet.

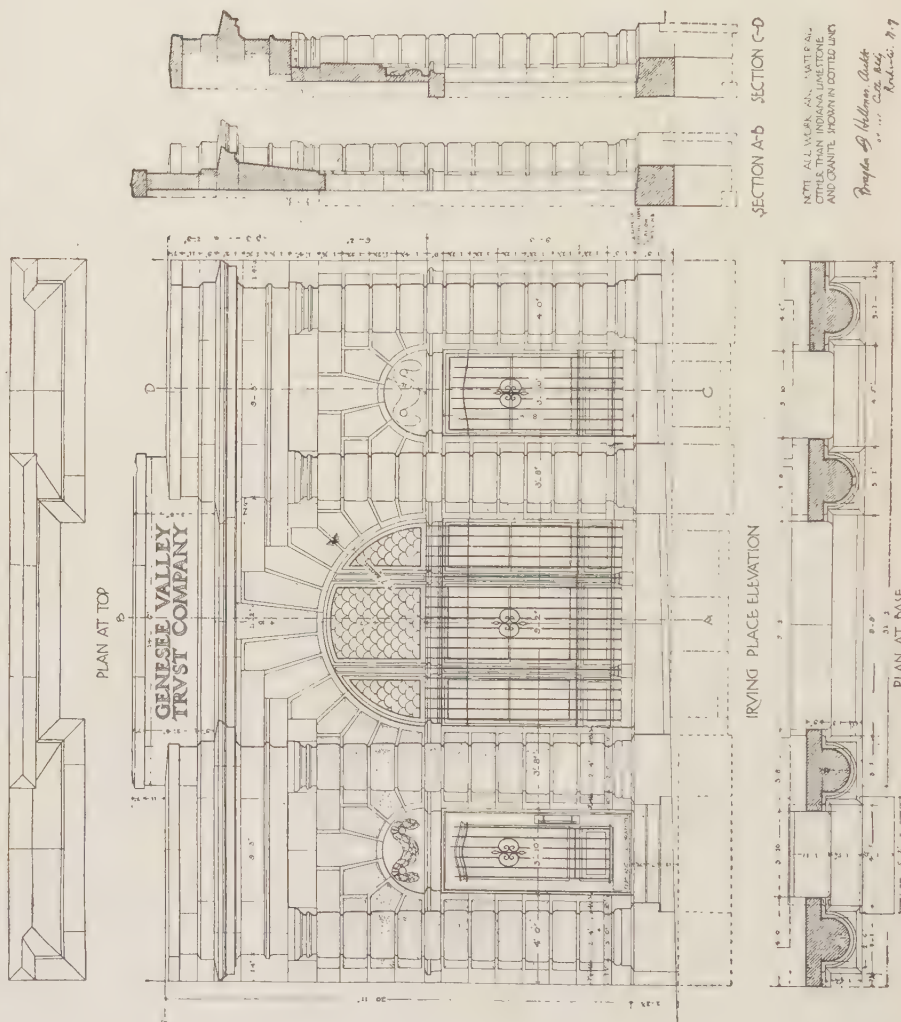
Fig. A shows the usual way of working out a back staircase entirely enclosed between partitions, one staircase going down under the other. This is very compact, and may be worked out in wood or iron and between plaster or brick walls. The space may be larger or smaller than that shown. The width of stairs from the finished wall to center of rail should never be less than 2 feet 2 inches for the smallest staircase, and usually 2 feet 8 inches is employed for a back staircase. Sometimes the newel posts are brought together as one, making what is practically a circular staircase.

Fig. B shows a combination staircase; that is to say, the front staircase goes up to a landing, and then continues in any direction to the second floor. From this landing a door opens, leading down to the service part of the house, giving many of the advantages of a back staircase, with loss of only a small amount of space.

Fig. C gives an interesting combination of staircase and fireplace. The fireplace is one step below the general floor level; and the ceiling is kept lower than the general ceiling of the room, with a small staircase leading up to a mezzanine story, above the fireplace, which may be arranged to look down on the main floor of the room or may form a sort of gallery.

Fig. D shows a staircase going up to a landing which is carried out into a room as a balcony indicated by dotted lines. At this level a little bay window is carried out over an outside doorway below. As there are only eleven risers shown, it would be necessary in this case to have the landing made of plank laid flat, to get head room for the seat.

Fig. E shows a compact arrangement of hall, coat closet, and out-



BILL OF INDIANA LIMESTONE - GENESEE VALLEY TRUST CO'S BUILDING

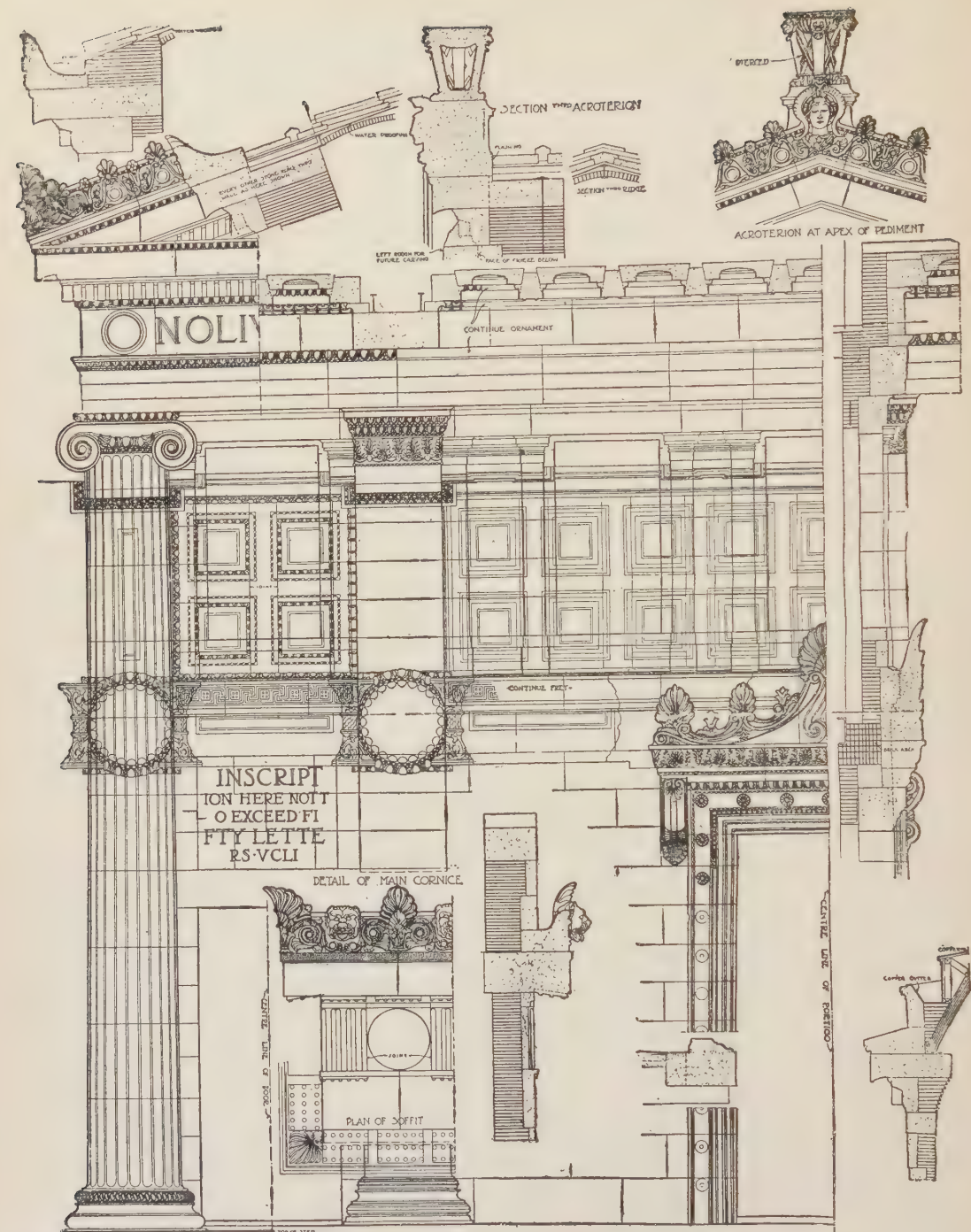


Fig. 54

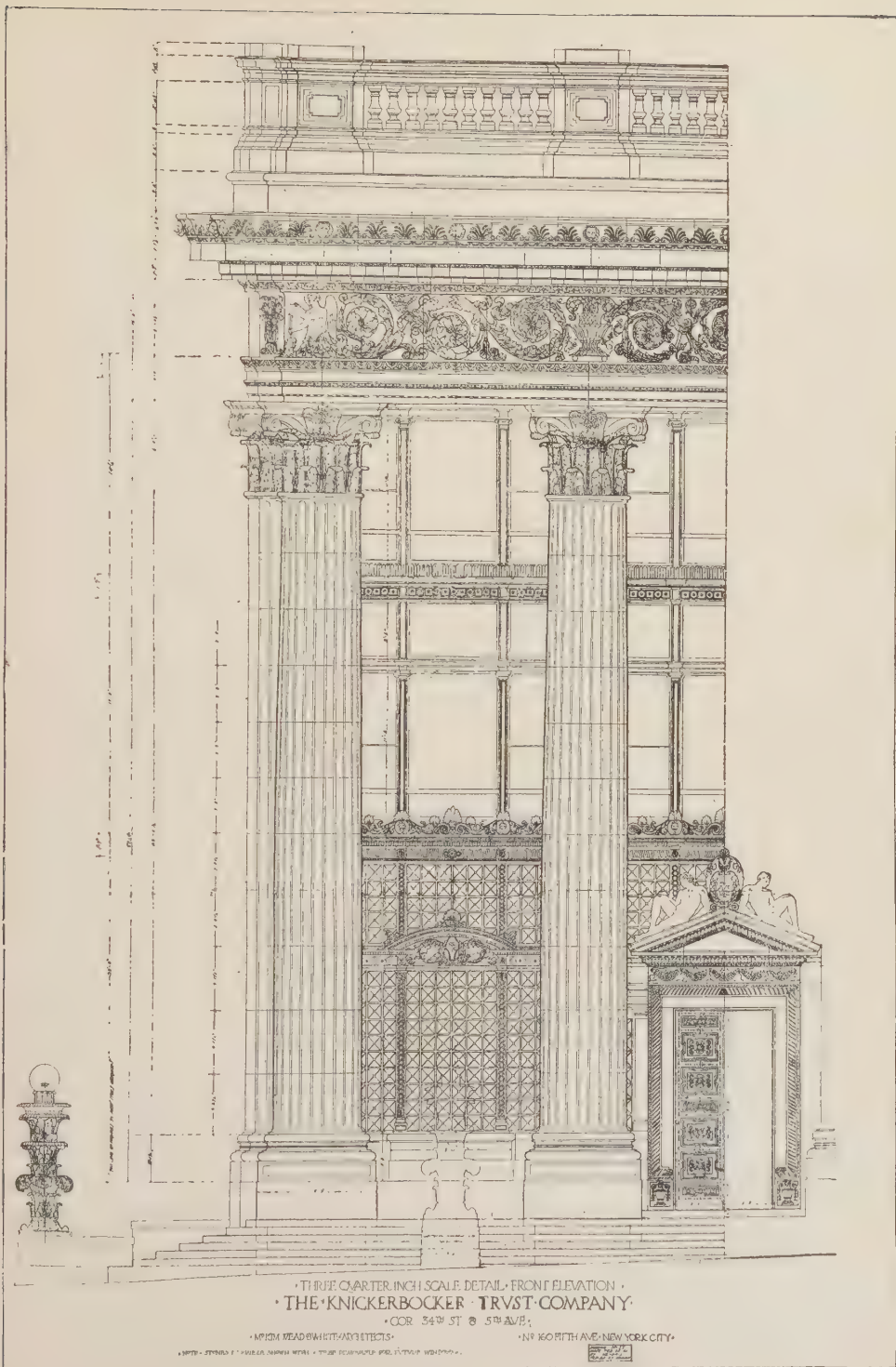


Fig. 55.

side vestibule, with an interesting arrangement of the ingle-nook and fireplace, and seats each side.

Fig. F shows another arrangement of circular staircase differing from that shown in Fig. A, as it contains space for a service elevator or lift.

Fig. G shows a scissors staircase, which is sometimes used in double houses occupied by different families on each floor. This construction makes a saving of space, as the staircases may be placed under each other, while each family is able to go from floor to floor by its own private staircase. This arrangement is also sometimes used in schoolhouses, where there is height enough to have mezzanine toilet rooms at the landings, with separate stairways for boys and girls in the same given space on plan.

Fig. H shows an arrangement for the fireplace between dining room and living room where space is desired for closets or serving room between. On one side is built the ordinary fireplace with seats on each side, the tiling being carried out to the end of the seats; on the other side the hearth is carried out with brick floor, and the hood is carried out over this so that a basket of coals can be set directly on the brick floor. Sometimes the fire-basket is placed below the floor level, so that the surface comes about on a level with the floor.

Figs. 52 to 55 show working drawings of prominent architectural firms. It should be noted how carefully and clearly everything is drawn—from the lettering to the sculptured parts.

The preliminaries to starting a drawing, are:

Stretch half a sheet of Whatman's Imperial cold-pressed paper, 22 by 15 inches in size. While this is drying, sketch out rapidly with pencil, T-square, and triangles, on a piece of manila detail paper, the main lines of the proposed drawing. This will show the proper placing of the drawing, and save much erasing on the final sheet.

Sometimes tracing paper may be mounted over the Whatman's paper, and a place cut for making the final drawing; or the study may be made directly on the tracing paper over the final sheet, and then cut out and redrawn or transferred.

The paper required for the first drawing is, therefore:

One sheet Whatman's "Imperial" drawing paper.

One yard manila detail paper.

Several yards of Rowney's English tracing paper.

A CKNOWLEDGMENT SHOULD BE MADE TO
THE SEVERAL ARCHITECTS, DESIGNERS
AND PUBLISHERS WHO HAVE ALLOWED
THEIR DRAWINGS TO BE REPRODUCED IN
THE SECTION ON ARCHITECTURAL LETTER-
ING, AND TO THE BATES & GUILD CO., OF
BOSTON, FOR PERMISSION TO INCLUDE THE
VARIOUS PLATES FROM "LETTERS AND LET-
TERING." A LARGER TREATISE BY FRANK
CHOUTEAU BROWN.

Here
lies interr'd
the Remains of
M^{rs} ELIZABETH FOSTER
Comfort of
M^r Elipha FOSTER
esq who died *May* 28
1773 Aged 61.
Years.

PUBBING OF INCISED SLATE LETTERING FROM HEAD STONE IN KING'S CHAPEL BURYING
GROUND, BOSTON, 1773.

ARCHITECTURAL LETTERING.

Architectural lettering may be divided into two general classes. The first is for titling and naming drawings, as well as for such notes and explanations as it is usual or necessary to put upon them; this may well be called "Office Lettering." The second includes the use of letters for architectural inscriptions to be carved in wood or stone, or cast in metal: for this quite a different character of letter is required, and one that is always to be considered in its relation to the material in which it is to be executed, and designed in regard to its adaptability to its method of execution. This may be arbitrarily termed "Inscription Lettering," and as a more subtle and less exact subject than office lettering it may better be taken up last.

OFFICE LETTERING.

Architectural office lettering has nothing in common with the usual Engineering letter, or rather, to be more exact, the reverse is true: Engineering lettering has nothing in common with anything else. Its terminology is wrong and needlessly confusing inasmuch as it clashes with well and widely accepted definitions. Therefore it will be necessary to start entirely anew, and if the student has already studied any engineering book on the subject, to warn him that in this instruction paper such terms as Gothic, etc., will be used in their well-understood Architectural meaning and must not be misinterpreted to include the style of letter arbitrarily so called by Engineers.

The first purpose of the lettering on an architectural plan or elevation is to identify the sheet with its name and general descriptive title, and further, to give the names of the owner and architect. The lettering for this purpose should always be rather important and large in size, and its location, weight and

height must be exactly determined by the size, shape and weight of the plan or elevation itself, as well as its location upon and relation to the paper on which it is drawn, in order to give a pleasing effect and to best finish or set off the drawing itself. The style of letter used may be suggested, or even demanded, by the design of the building represented. Thus Gothic lettering might be appropriate on a drawing of a Gothic church, just as Italian Renaissance lettering would be for a building of that style, or as Classic lettering would seem most suitable on the drawings for a purely Classic design; while each letter or legend would look equally out of place on any one of the other drawings.

LETTER FORMS.

It may be said that practically all the lettering now used in architectural offices in this country is derived, however remotely it may seem in some cases, from the old Roman capitals as developed and defined during the period of the Italian Renaissance. These Renaissance forms may be best studied first at a large size in order to appreciate properly the beauty and the subtlety of their individual proportions. For this purpose it is well to draw out at rather a large scale, about four or four and one-half inches in height, a set of these letters of some recognized standard form, and in order to insure an approximately correct result some such method of construction as that shown in Figs. 1 and 2 should be followed. This alphabet, a product of the Renaissance, though of German origin, is one adapted from the well-known letters devised by Albrecht Dürer about 1525, and is here merely redrawn to a simpler constructive method and arranged in a more condensed fashion. This may be accepted as a good general form of Roman capital letter in outline, although it lacks a little of the Italian delicacy of feeling and thus betrays its German origin.

The letter is here shown in a complete alphabet, including those letters usually omitted from the Classic or Italian inscriptions: the J, U (the V in its modern form) and two alternative W's, which are separately drawn out in Fig. 1.

These three do not properly form part of the Classic alphabet and have come into use only within comparatively modern

times. For this reason in any strictly Classic inscription the letter I should be used in place of the J, and the V in place of the U. It is sometimes necessary to use the W in our modern spelling, when the one composed of the double V should always be employed.

The system of construction shown in this alphabet is not exactly the one that Dürer himself devised. The main forms of the letters as well as their proportions are very closely copied from the original alphabet; but the construction has been somewhat simplified and some few minor changes made in the letters themselves, tending more towards a modern and more uniform character. The two W's, one showing the construction with the use of the two overlapping letter V's, and one showing the W incorporated upon the same square unit which carries the other

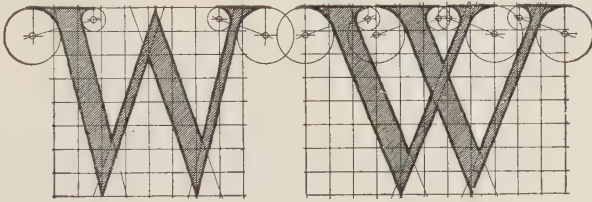


Fig. 1. Two Alternative Forms of the Letter W, to accompany the Alphabet shown in Fig. 2.

letters (the latter form being the one used by Dürer himself), are shown separately in Fig. 1. It should be noticed that every letter in the **alphabet**, except one or two that of necessity lack the requisite width—such as the I and J—is based upon and fills up the outline of a square, or in the case of the round letters, a circle which is itself contained within the square. This alphabet should be compared with the alphabet in Fig. 4, attributed to Sebastian Serlio, an Italian architect of the sixteenth century. By means of this comparison a very good idea may be obtained of the differences and characteristics which distinguish the Italian and German traits in practically contemporaneous lettering.

After once drawing out these letters at a large size, the beginner may find that he has unconsciously acquired a better constructive feeling for the general proportions of the *individual* let-

ters and should thereafter form the letters free-hand without the aid of any such scheme of construction, merely referring occasionally to the large chart as a sort of guide or check upon the



Fig. 2. Alphabet of Classic Renaissance Letters according to Albrecht Dürer, adapted and reconstructed by F. C. Brown. (See Fig. 1.)

eye. For this purpose it should be placed conveniently, so that it may be referred to when in doubt as to the outline of any individual letter. By following this course and practicing thor-

oughly the use of the letters in word combinations, a ready command over this important style of letter will eventually be acquired.

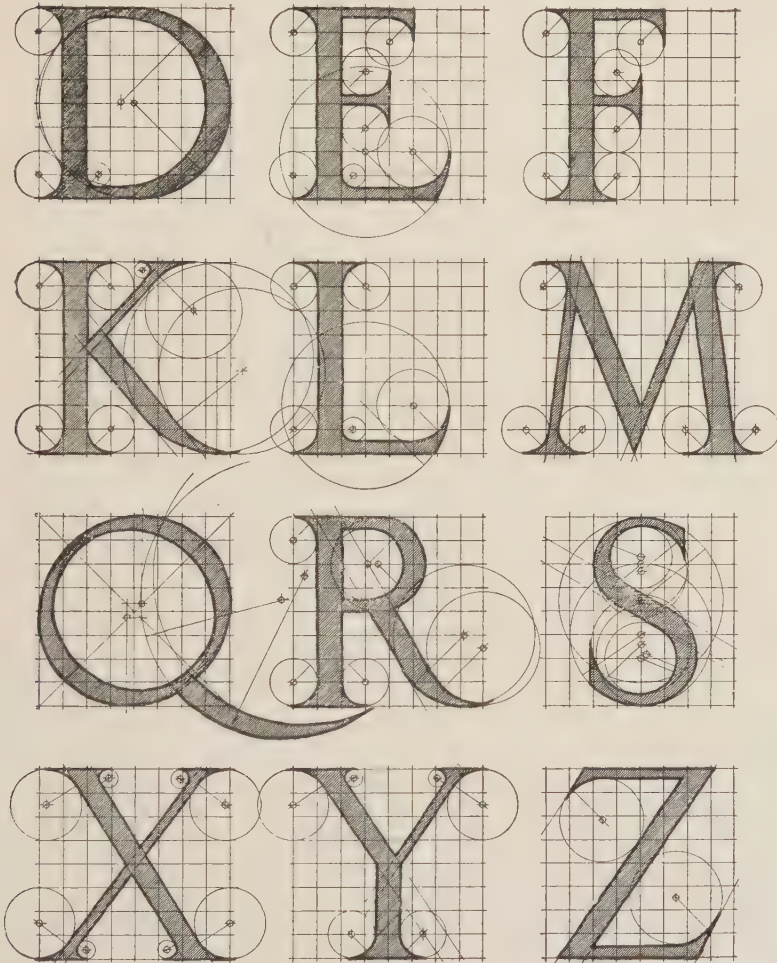


Fig. 2. (Continued)

In practice it will soon be discovered that a letter in outline and of a small size is more difficult to draw than one solidly blacked-in, because the defining outline must be even upon both

its edges; and that as the eye follows more the inner side of this line than it does the outer, both in drawing and afterwards in recognizing the letter form, the inaccuracies of the outer side of the line are likely to show up against the neighboring letters, and produce an irregularity of effect that it is difficult to overcome, especially for the beginner; while in a solidly blacked-in letter, it is the outline and proportions alone with which the draftsman must concern himself. Therefore, a letter in the same style is more easily and rapidly drawn when solidly blacked-in than as an "open" or outline letter. In many cases where it is desired to give a more or less formal and still sketchy effect, a letter of the same construction but with certain differences in its characteristics may be used. It should not be so difficult to draw, and much of the same character may still be retained in a form that



Fig. 3. Title from Competitive Drawings for the Taunton Public Library, Albert Randolph Ross, Architect.

is much easier to execute. Some such letter as is shown at the top of Fig. 10, or any other personal variation of a similar form such as may be better adapted to the pen of the individual draftsman would answer this purpose. The titles shown in Figs. 3 and 5 include letters of this same general type, but of essentially different character.

In drawing a letter that is to be incised in stone it is customary to show in addition to the outline, a third line about in the center of the space between the outside lines. This additional line represents the internal angle that occurs at the meeting of the two sloping faces used to define the letter. An example is shown in Figs. 24 and 25, while in Fig. 7, taken from drawings for a building by McKim, Mead & White, the same convention is frankly employed to emphasize the principal lettering of a pen-drawn title.

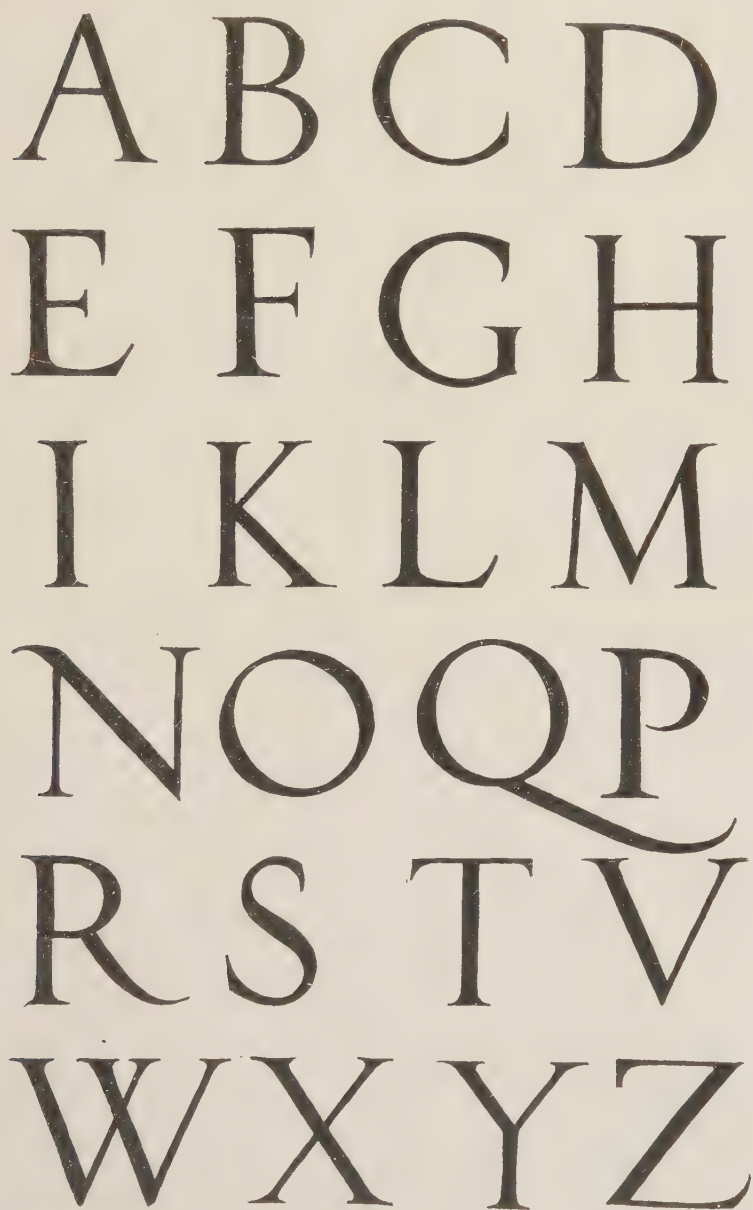


Fig. 4. Italian Renaissance Alphabet, according to Sebastian Serlio.

For the purpose of devising a letter that may be drawn with one stroke of the pen and at the same time retain the general character of the larger, more Classic alphabet, in order that it may be consistently used for less important lettering on the same drawing, it is interesting to try the experiment of making a skeleton of the letters in Figs. 1 and 2. This consists in running a single heavy line around in the middle of the strokes that form

JERSEY · CITY · FREE · PVBLIC · LIBRARY

· SCALE · ONE · INCH · EQUALS · FOUR · FEET ·

BRITE · AND · BACON · ARCHITECTS · III · FIFTH · AVENUE · NEW · YORK · CITY ·

Fig. 5. Title from Drawings for the Jersey City Public Library,
Brite & Bacon, Architects.

the outline of these letters. This "skeleton" letter, with a few modifications, will be found to make the best possible capital letter for rapid use on working drawings, etc., and in a larger size it may be used to advantage for titling details (Fig. 9). It will also prove to be singularly effective for principal lettering



Fig. 6. "Skeleton" Construction of Letters shown in Fig. 2.

on plans, to give names of rooms, etc. (Fig. 13), while in a still smaller size it may sometimes be used for notes, although a minuscule or lower case letter will be found more generally useful for this purpose.

In Fig. 6 are shown four letters where the skeleton has been drawn within the outline of the more Classic form. It is un-

• THREE QUARTER INCH SCALE DETAIL, FRONT ELEVATION •
 • THE KNICKERBOCKER TRVST COMPANY •
 • COR 34TH ST @ 5TH AVE •
 • MCKIM MEAD & WHITE ARCHITECTS • N^o 160 FIFTH AVE, NEW YORK CITY •

REMOVED - 1903
 MADE FEB 20 '02
 BY THE
 BOARD OF ARCHITECTS

• NOTE • STONES IN FRIEZE SHOWN WITH TO BE REMOVABLE FOR FUTURE WINDOWS •

Fig. 7. Title from Drawing for the Knickerbocker Trust Co., New York.
 McKim, Mead & White, Architects.

necessary to continue this experiment at a greater length, as it is believed the idea is sufficiently developed in these four letters. In addition it is merely the theoretical part of the experiment that it is desirable to impress upon the draftsman. In practice it will be found advisable to make certain further variations from this "skeleton" in order to obtain the most pleasing effect possible with a single-line letter. But the basic relationship of these two forms will amply indicate the propriety of using them in combination or upon the same drawing.

It will be found that the letter more fully shown in Fig. 10 is almost the same as the letter produced by this "skeleton" method, except that it is more condensed. That is, the letters are narrower for their height and a little freer or easier in treatment. This means that they can be lettered more rapidly and occupy less space, and also that they will produce a more felicitous effect.

In actual practice, the free capitals shown in Fig. 10 will be found to be of the shape that can be made most rapidly and easily, and this style or some similar letter should be studied and practiced very carefully.

Other examples of similar one-line capitals will be found

used with classic outline or blacked-in capitals on drawings, Figs. 3, 5 and 7.

In Figs. 8, 9 and 13 these one-line letters are used for principal titles as well, and with good effect.

In Fig. 10 is shown a complete alphabet of this single-line

BILL OF INDIANA LIMESTONE
GENESEE VALLEY TRUST CO'S BUILDING

Fig. 8. Title from Architectural Drawing, Claude Fayette Bragdon, Architect.

letter, and the adaptability of this character for use on details is indicated by the title taken from one and reproduced in Fig. 9. In the same plate, Fig. 10, is also shown an excellent form of small letter that may be used with any of these capitals. It is

DETAIL NO. (122) OF
FREESTONE SHEET C
405 COMMONWEALTH AVE
September. 8. 1901.
Frank. Chouteau. Brown. Architect.
No. 9. Park. Street. Boston Mass.

Fig. 9. Title from Detail.

quite as plain as any Engineer's letter, and is easier to make, and at the same time when correctly placed upon the drawing it is much more decorative. This entire plate is reproduced at a slight reduction from the size at which it was drawn, so that it may be studied and followed closely.

·LETTERS·FOR·
·PRINCIPAL·
·TITLES·

·SCALE·THREE·QUARTERS·
·OF·AN·INCH·EQUALS·ONE·
·FOOT

·Small·Letters·aabcd·
·efghijklmnopqrstuv·
·wxyz·for·rapid·work·

CAPITALS·ABCDEFGHI
FHIJKLMNOPQRST
UVWXYZ·FREE·HAND

Fig. 10. Letters for Architectural Office use.

Fig. 10 should be most carefully studied and copied, as it represents such actual letter shapes as are used continually on

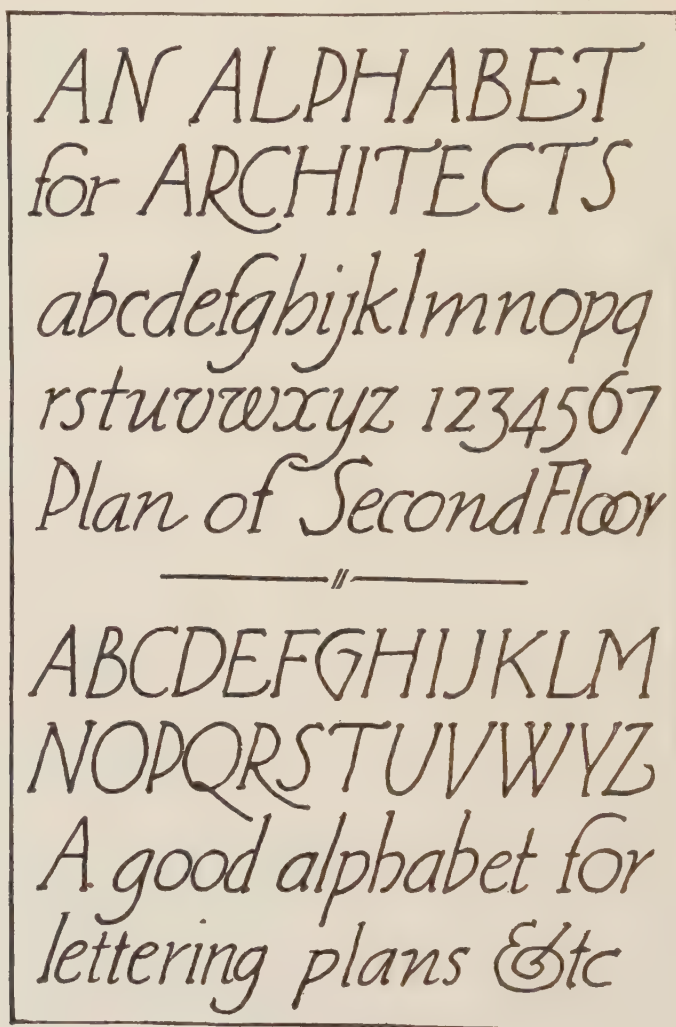


Fig. 11. Single-line Italic Letters, by Claude Fayette Bragdon.

architectural drawings, and such as would, therefore, be of the most use to the draftsman. He should so perfect himself in these alphabets that he will have them always at hand for instant use.

The alphabets of capital and minuscule one-line letters shown in Fig. 11 are similar in general type to those we have just been discussing, except that they are sloped or inclined letters and therefore come under the heading of "Italics." The Italic letter is ordinarily used to emphasize a word or phrase in a sentence where the major portion of the letters are upright;

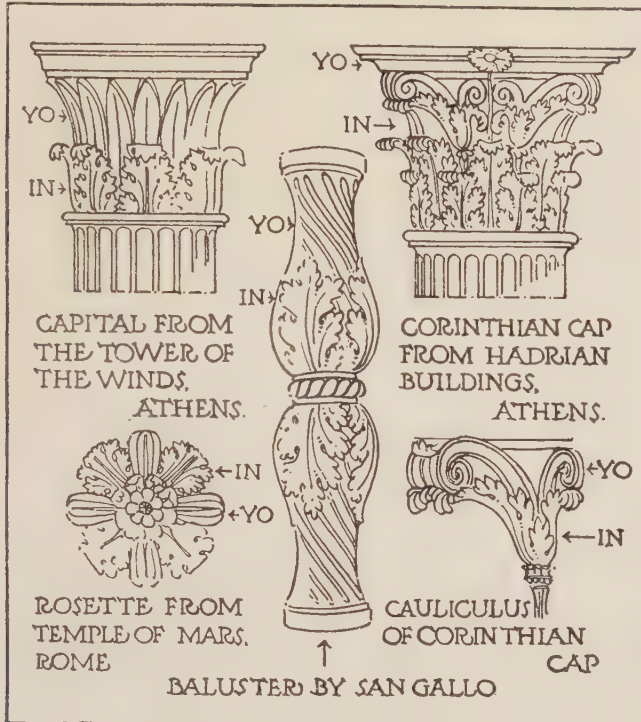


Fig. 12. Drawing, by Claude Fayette Bragdon.

but where the entire legend is lettered in Italics this effect of emphasis is not noticeable, and a pleasing and somewhat more unusual drawing is likely to result. If it is deemed advisable to emphasize any portion of the lettering on such a drawing, it is necessary only to revert to the upright form of letter for that portion.

The single-line capitals and small letters on the usual architectural plan or working drawing are illustrated in Fig. 13, where such a plan is reproduced. This drawing was not one made spe-

cially to show this point, but was selected from among several as best illustrating the use of the letter forms themselves, as well as good placing and composition of the titles, both in regard to the general outline of the plan and their spacing and location in the various rooms. It is apparent that it is not exactly accurate in the centering in one or two places. For instance, in the general title, the two lower lines are run too far to the right of the center line, and this should be corrected in any practice work where these principles will be utilized. It may be well to say that the actual length of this plan in the original drawing was thirteen inches, and the rest of it large in proportion. The student should not attempt to redraw any such example as this at the size of the illustration. He must always allow for the reduction from the original drawing, and endeavor to reconstruct the example at the original size, so that it would have the same effect when reduced as the model that he follows.

The letters for notes and more detailed information should be much simpler and smaller than and yet may be made to accord with the larger characters. Such a rapid letter as that shown in Fig. 10, for instance, may be used effectively with a severely classical title. Of course, no one with a due regard for propriety or for economy of time would think of using the Gothic small letter for this purpose.

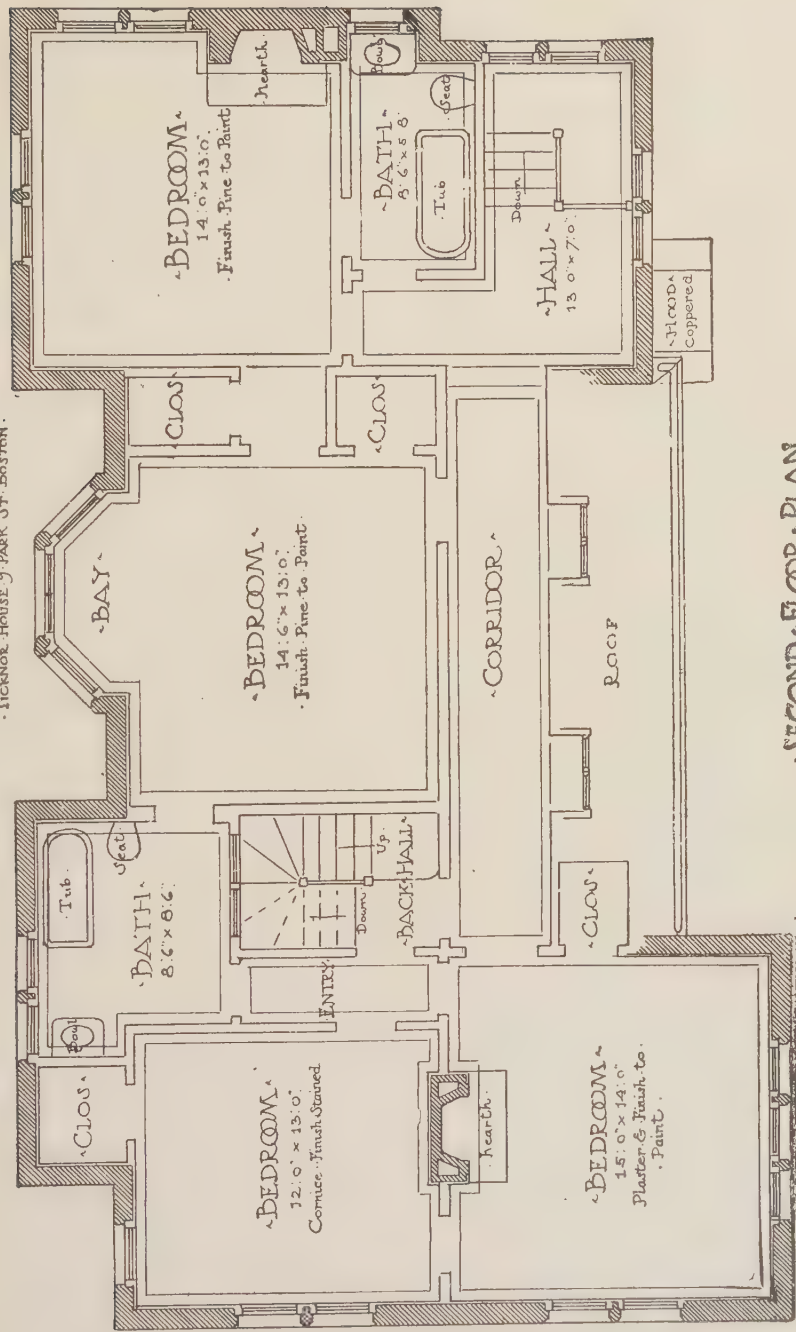
The portion of a drawing shown in Fig. 14 illustrates another instance of the use of lettering on an architectural working drawing. The lettering defined by double lines is in this case a portion of the architectural design, the two letters on the pendant banners being sewn on to the cloth while those on the lower portion of the drawing are square-raised from the background and gilded. Single-line capitals are used in this example for the notes and information necessary to understand the meaning of the drawing.

A drawing of distinction should have a principal title of equal beauty, such as that shown in Fig. 5 or Fig. 7. The excellent lettering reproduced in Fig. 12, from a drawing by Mr. Claude Fayette Bragdon, is a strongly characteristic and individual form, although based on the same "skeleton" idea as the other types of single-line lettering already referred to.

WORK NO. 12- DRAWING 86

EDGEHILL
NEW HAMPSHIRE

JUNE 23, 1903.
FRANK CHOUTEAU BROWN ARCHT.
TICKNOR HOUSE 9 PARK ST. BOSTON.



SECOND FLOOR PLAN

1/2" = 1' - 0"

Fig. 13.

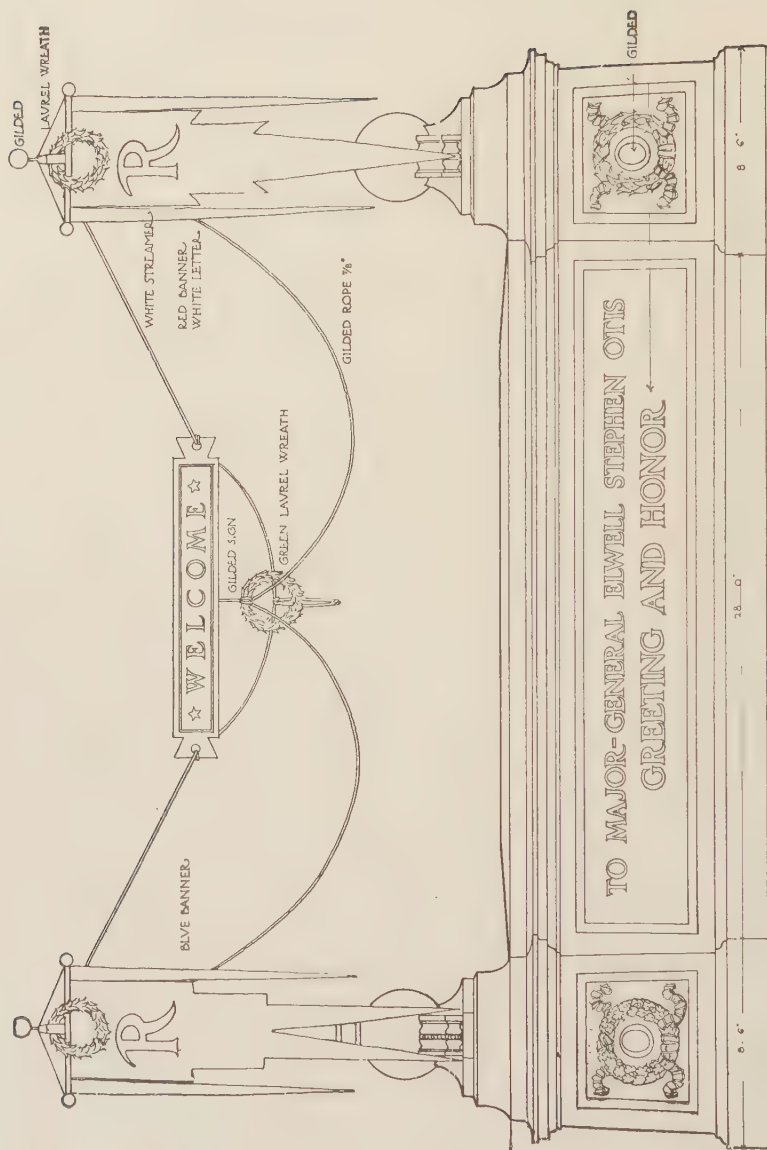


Fig. 14. Upper Portion of Drawing for Otis Memorial Arch, Claude Fayette Bragdon, Architect.

The "skeleton" letter, formed on the classic Roman letter, displays quite as clearly as does the constructive system of Albrecht Dürer, the distinctively *square* effect of the Roman capital. The entire Roman alphabet is built upon this square and its units. The letters shown in Figs. 22 and 23 are redrawn from rubbings of old marble inscriptions in the Roman Forum, and may be taken as representative of the best kind of classic letter



Fig. 15. Advertising Design, by Addison B. Le Boutillier.

for incision in stone. The Dürer letter, while a product of a later period, is fundamentally the same, and differs only in minor, if characteristic, details. However, for purposes of comparison it will serve to show the difference between a letter incised in marble, or in any other material, and one designed for use in lettering in black ink against a white background.

COMPOSITION.

After acquiring a sufficient knowledge of letter forms, the student is ready to begin the study of "lettering." While a knowledge of architectural beauty of form is the first essential, it

BIGELOW, KENNARD AND CO.
WILL HOLD, IN THEIR ART
ROOMS, MARCH 25 TO APRIL 6
INCLUSIVE, A SPECIAL EXHIBI-
TION AND SALE OF GRUEBY
POTTERY INCLUDING THE
COLLECTION SELECTED FOR
THE BUFFALO EXPOSITION
MDCCCCI



WASHINGTON STREET, COR-
NER OF WEST STREET, BOSTON

Fig. 16. Cover Announcement, by Addison B. Le Boutillier.

is not the vital part in lettering, for the *composition* of these separate characters is by far the most important part of the problem.

Composition in lettering is almost too intangible to define by any rule. All the suggestions that may be given are of necessity laid out on merely mathematical formulæ, and as such are incapable of equaling the result that may be obtained by spacing and producing the effect solely from artistic experience and intuition. The final result should always be judged by its effect upon the eye, which must be trained until it is susceptible to the slightest deviation from the perfect whole. It is more difficult to define what good composition is in lettering than in painting or any other of the more generally accepted arts, and it resolves itself back to the same problem. The eye must be trained by constant study of good and pleasing forms and proportions, until it appreciates instinctively almost intangible mistakes in spacing and arrangement.

This point of "composition" is so important that a legend of most beautiful individual letter forms, badly placed, will not produce as pleasing an effect as an arrangement of more awkward letters when their composition is good. This quality has been so much disregarded in the consideration of lettering, that it is important the student's attention should be directed to it with additional force, in order that he may begin with the right feeling for his work.

An excellent example of composition and spacing is shown in Fig. 16, from a drawing by Mr. Addison B. Le Boutillier. The relation between the two panels of lettering and the vase form, and the placing of the whole on the paper with regard to its margins, etc., are exceptionally good, and the rendered shape of the vase is just the proper weight and color in reference to the weight and color of the lettered panels.

In this reproduction the border line represents the edge of the paper upon which the design itself was printed, and not a border line enclosing the panel. The real effect of the original composition can be obtained only by eliminating the paper outside of this margin and by studying the placing and mass of the design in relation to the remaining "spot" and proportions of the paper. Perhaps the simplest and most certain way to realize the

effect of the original is to cut out a rectangle the size of this panel from a differently colored piece of paper, and place it over the page as a "mask," so that only the outline of the original design will show through.

The other example by the same designer, shown in Fig. 15, is equally good. The use of the letter with the architectural ornament, and the form, proportion, spacing and composition of the lettering are all admirable.

The title page, by Mr. Claude Fayette Bragdon, shown in

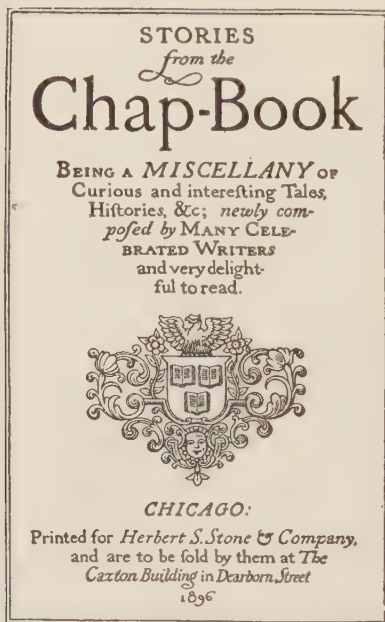


Fig. 17, is a composition including the use of many different types of letters; yet all belong to the same period and style, so that an effect of simplicity is still retained. In composition, this page is not unlike its possible composition in type, but in that case no such variety of form for the letters would be feasible, while the entire design has an effect of coherence and fusion which the use of a pen letter alone makes possible, and which could not be obtained at all in typographical examples. The treatment of the ornament incorporated in this design should be noticed for its weight and rendering, which

Fig. 17. Title Page, by Claude Fayette Bragdon.

bear an exact relation to the "color" of the letter employed.

In Fig. 18 is a lettered panel that will well repay careful study. The composition is admirable, the letter forms of great distinction—especially the small letters—and yet this example has not the innate refinement of the others. The decorative panel at the top is too heavy, and the ornament employed has no special beauty of form, fitness, or charm of rendering (compare Figs. 15 and 16), while the weight of the panel requires

some such over-heavy border treatment as has been used. Here, again, in the slight Gothic cusping at the angles a lack of restraint or judgment on the part of the designer is indicated, this Gothic touch being entirely out of keeping with the lettering itself, and only partially demanded by the decorative panel. Of course, it

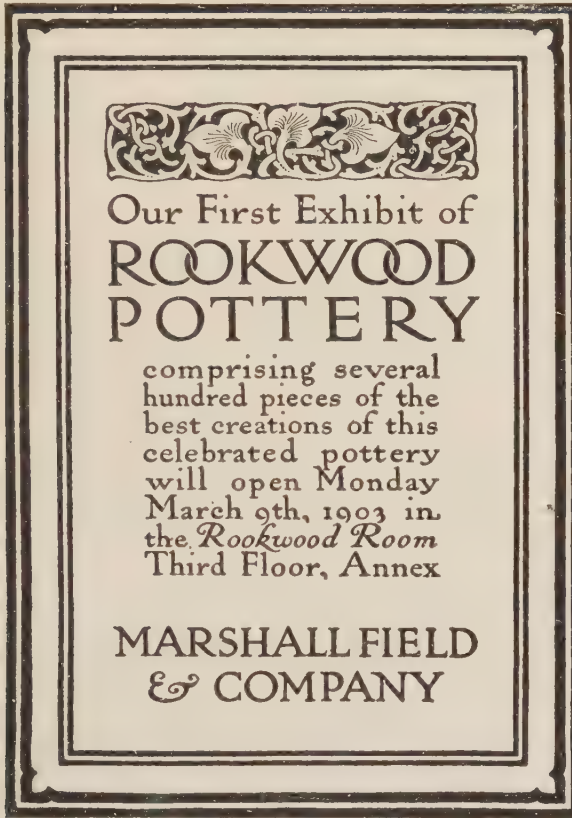


Fig. 18. Advertising Announcement.

is easy to see that these faults are all to be attributed to an attempt to attract and hold the eye and thus add to the value of the design as an advertisement; but a surer taste could have obtained this result and yet not at the expense of the composition as a whole. It is nevertheless an admirable piece of work.

In Fig. 19 is shown an example of the use of lettering in

composition, in connection with a bolder design, in this case for a book cover, by Mr. H. Van Buren Magonigle. Note the nice sense of relation between the style of lettering employed and the design itself, as well as the subject of the work. The letter form is a most excellent modernization of the classic Roman letter shape (compare Figs. 22 and 23).



Fig. 19. Book Cover, by H. Van Buren Magonigle.

The student must be ever appreciative of all examples of the good and bad uses of lettering that he sees, until he can distinguish the niceties of their composition and appreciate to the utmost such examples as the first of these here shown. It is only by constant analysis of varied examples that he can be able to distinguish the points that make for good or bad lettering.

SPACING.

There is a workable general rule that may be given for obtaining an *even* color over a panel of black lettering; that is, if the individual letters are so spaced as to have an equal area of white between them this *evenness* of effect may be attained. But when put to its use, even this rule will be found to be surrounded by pitfalls for the unwary. This rule for spacing must not be understood to mean that it applies as well to *composition*. It does not: it is, at the best, but a makeshift to prevent one from going far wrong in the general tone of a panel of lettering, and must therefore fully apply only to a legend employing one single type of letter form.

One with sufficient authority and experience to give up dependence upon merely arbitrary rules, and to rely upon his own judgment and taste may, by varying sizes and styles of letters, length of word lines, etc., obtain a finer and much more subtle effect.

To acquire this authority in modern lettering it is necessary to observe and study the work turned out today by the best designers and draftsmen, such as the drawings of Edward Penfield, Maxfield Parrish, A. B. Le Boutillier and several others. The architectural journals, also, publish from month to month beautifully composed and lettered scale drawings by such draftsmen as Albert R. Ross, H. Van Buren Magonigle, Claude Fayette Bragdon, Will S. Aldrich and others, who have had precisely the same problem to solve as is presented to the draftsman in every new office drawing that he begins.

Of course, the freer and the further removed from a purely Classic capital form is the letter shape employed by the draftsman, the less obliged is he to follow Classic precedent; but at the same time he will find that his drawing at once tends more toward the bizarre and eccentric, and the chances are that it will lose in effectiveness, quietness, legibility and strength.

The student will soon find that he unconsciously varies and individualizes the letters that he constantly employs, until they become most natural and easy for him to form. This insures his developing a characteristic letter of his own, even when at the start he bases it upon the same models as have been used by many other draftsmen.

MINUSCULE OR SMALL LETTERS.

In taking up the use of the small or minuscule letter, a word of warning may be required. While typographical work may furnish very valuable models for composition and for the individual shapes of minuscule letters, they should never be studied for the *spacing* of letters, as such spacing in type is necessarily arbitrary, restricted and often unfortunate. Among the lower case types will be found our best models of individual minuscule letter forms, and the Caslon old style is especially to be commended in this respect; but in following these models the aim must be to get at and express the essential characteristics of each letter form, to reduce it to a "skeleton" after much the same fashion as has already been done with the capital letter, rather than to strive to copy the inherent faults and characteristics of a type-minuscule letter. The letter must become a "pen form" before it will be appropriate or logical for pen use; in other words, the necessary limitations of the instrument and material must be yielded to before the letter will be amenable to use for lettering architectural drawings.

The small letters shown in Figs. 17, 18 and 20 are all adapted from the Caslon or some similar type form, and all exhibit their superiority of spacing over the possible use of any type letter. Fig. 20 is a particularly free and beautiful example indicating the latent possibilities of the minuscule form that are as yet almost universally disregarded. An instance of the use of the small letter shown in a complete alphabet in Fig. 10, may be seen in Figs. 9 and 13.

In lettering plans for working drawings, the small letter is used a great deal. All the minor notes, instructions for the builders or contractors, and memoranda of a generally unimportant character, are inscribed upon the drawing in these letters. Referring again to Fig. 10, the letters at the top of the page would be those used for the principal title, the name of the drawing, the name of the building or its owner, while the outline capitals would be used in the small size beneath the general title, to indicate the scale and the architect, together with his address. In a small building, or one for domestic use, these same letters would be employed in naming the various rooms, etc., although in an

Admodum Reverendus et
nūs Martinus à Schaumber
præpositus a XXXVII. annis pr
Senior factus nec non Bambe
sis Cathedralium Ecclesiar
tis suæ 63. pie in Domino

elaborate ornamental or public building, letters similar to those in the principal title might be better used, while the minuscule letter would be utilized for all minor notes, memoranda, directions, etc. By referring to Figs. 3, 5, 7, 8, 9, 13 and 14, examples from actual working drawings and plans are shown, which should sufficiently indicate the application of this principle.

It must again be emphasized that practice in the use of these forms combined together in words, as well as in more difficultly composed titles and inscriptions where various sizes and kinds of letters are employed, is the only method by which the draftsman can become proficient in the art of lettering; and even then he must intelligently study and criticise their effect

INTERLUDES
beneath the lines of SIR
RICHARD LOVELACE'S
POEM called — "To Lucafta
on going to the vvars"
vvhich saith :

Fig. 20. Pen-drawn Heading, by Harry Everett Townsend.

after they are finished, as well as study continually the many good drawings carrying lettering reproduced in the architectural journals. For this purpose, in order to keep abreast of the modern advance in this requirement, he must early learn to distinguish between the instances of good and bad composition and lettering.

ARCHITECTURAL INSCRIPTION LETTERING.

The use of a regular Classic letter for any purpose necessitates the reversion to and the study of actual Classic examples for spacing and composition. In using this letter in a pen-drawn design, certain changes must be made in adapting it from the incised stone-cut form—which variations are, of course, practically the reverse of those required in first adapting the letter for use in stone. The same letter for stone incision requires, in addition, a careful consideration of the nature of the material, and the spacing and letter section that it allows. Also the effect

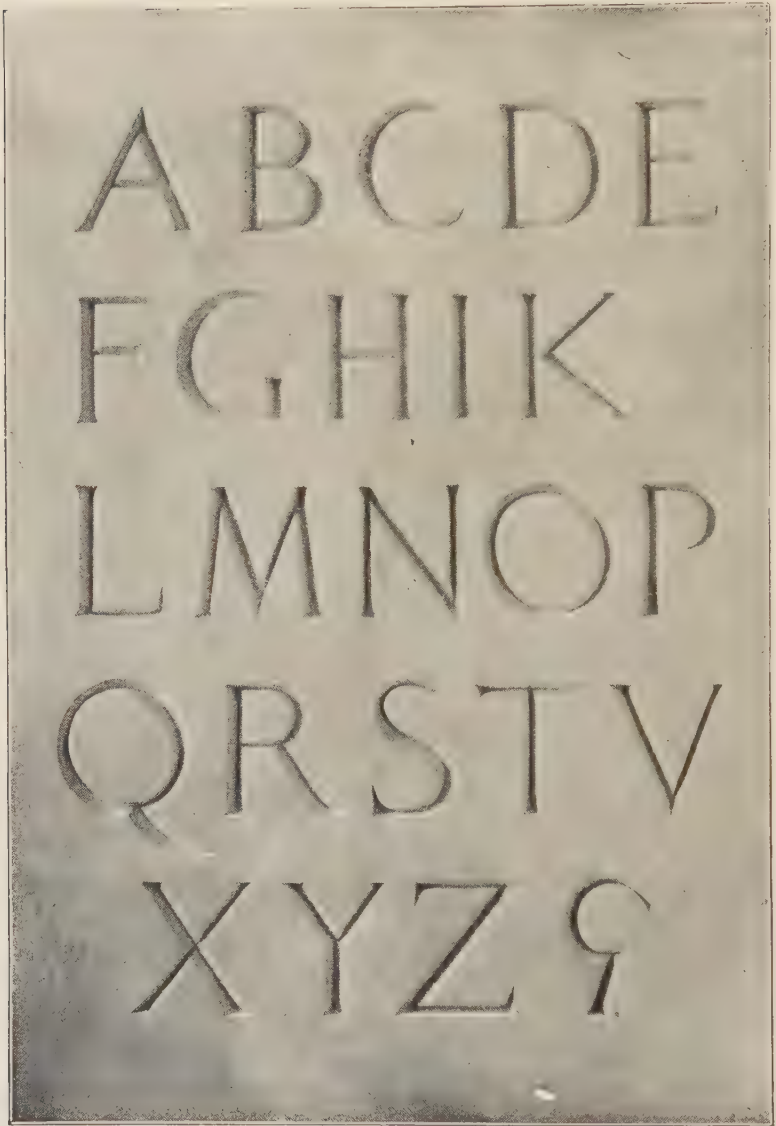


Fig. 21. Study for Lettering on Granite Frieze of Boston Public Library,
McKim, Mead & White, Architects.

of a letter in the inscription in place must be carefully studied, its height above or below and relation to the eye of the observer. The fact is that the letter form must in this case be determined solely by the light and shadow cast by the sun on a clear, bright day, or diffused more evenly on a cloudy one. If in an interior location its position in regard to light and view-point is even more important, as the conditions are less variable.

CLASSIC ROMAN LETTERS.

In any letter cut in stone, or cast in metal, it is not the outline of the letter that is seen by the eye of the observer, but the *shadow* cast by the *section used to define the letter*. This at once changes the entire problem and makes it much more complicated. In incising or cutting a letter into an easily carved material, such as stone or marble, we have the examples left us by the inventors, or at least the adapters, of the Roman alphabet. They have generally used it with a V-sunk section, and in architectural and monumental work this is still the safest method and the one most generally followed. One improvement has been made in adapting it to our modern conditions. The old examples were most often carved in a very fine marble which allowed a deep sinkage at a very sharp angle, thus obtaining a well-defined edge and a deep shadow. In most modern work the letters are cut in sandstone or even in such coarse material as granite, where sharp angles and deep sinkage of the letter-section is either impossible, or for commercial reasons influencing both contractors and stonecutters, very hard to obtain. To counterbalance this fault a direct sinkage at right angles to the surface of the stone before beginning the V section has been tried, and is found to answer the purpose very well, as it at once defines the edge of the letter with a sharp shadow. See the two large sections shown in the upper part of Fig. 31.

This section requires a letter of pretty good size and width of section, and, therefore, may be used only on work far removed from the eye, as is indeed alone advisable. An inscription that is to be seen close at hand must rely upon the more correct section and be cut as deeply as possible. For lettering placed at a great height, an even stronger effect may be obtained by making the incised section square, and sinking it directly into the stone.

Such pleasant grading of shadows as may be attained by the other method is then impossible, and there are no subtle cross

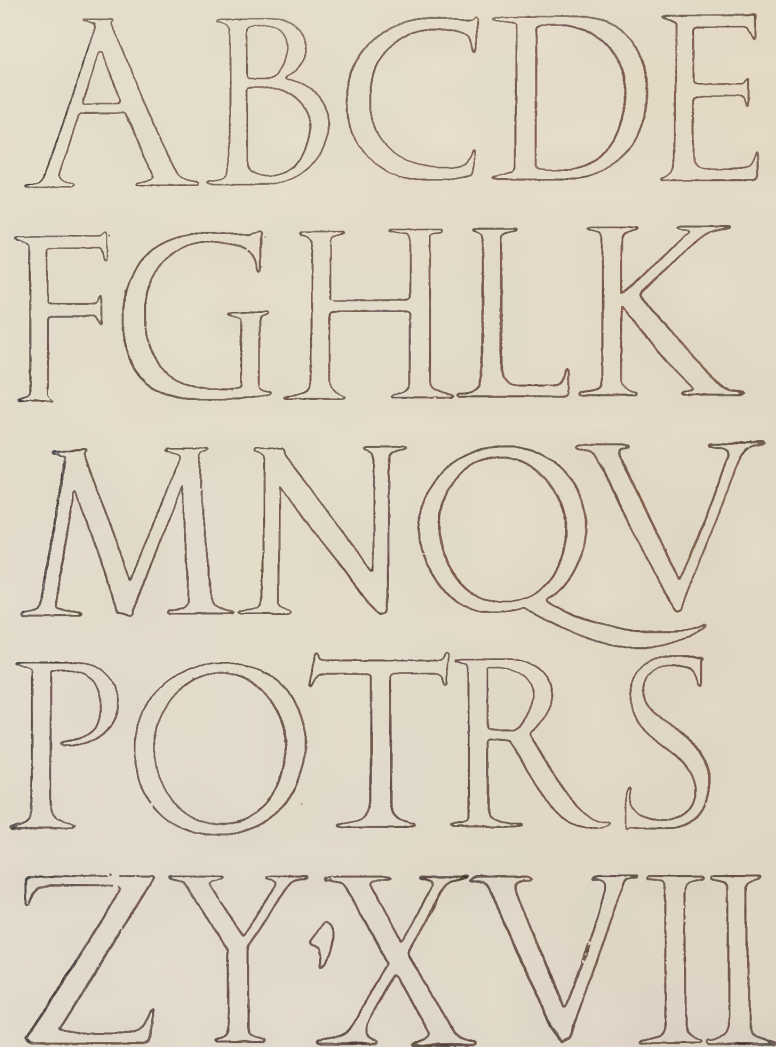


Fig. 22. Classic Roman Alphabet.

From Marble Inscriptions in the Roman Forum.

lights on the rounding letters to add interest and variety, but the letter certainly carries farther and has more strength.

In Fig. 21 is shown a photograph from a model of the incised V-sunk letters cut in granite on the frieze of the Boston

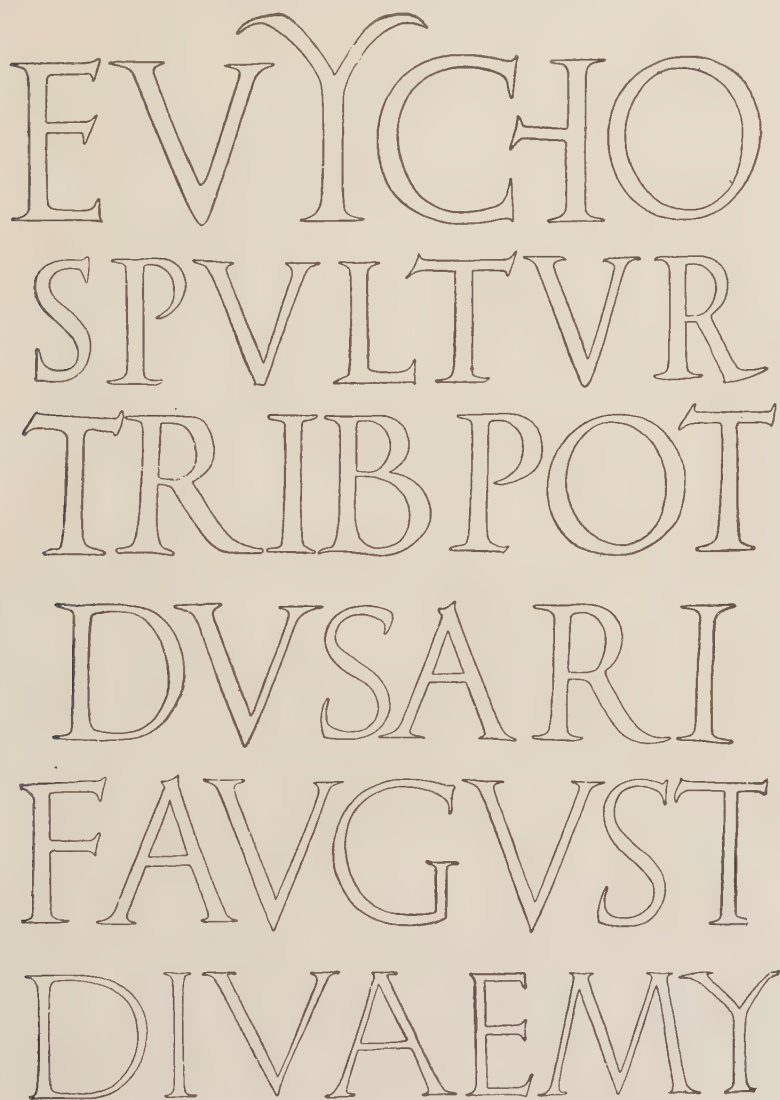


Fig. 23. Fragments of Classic Roman Inscriptions.

Public Library. This photograph indicates the shadow effect that defines the incised form of the letter, and will assist the student

somewhat in determining the section required for the best effect. It will be observed that this letter is different in character from the one used by the same architects in a different material, sandstone, shown in Fig. 24.

In Fig. 22 is shown an alphabet redrawn from a rubbing of Roman lettering, and in Fig. 23 are shown portions of Classic inscriptions where letters of various characters are indicated. These letters were very sharply incised with a V-sunk section in marble, and were possibly cut by Greek workmen in Rome. It is on some such alphabet as this that we must form any modern letter to be used in a Classic inscription or upon a Classic building. These forms should be compared with the letters shown in Fig. 24, on the Architectural Building at Harvard, by McKim, Mead & White, architects, where they were employed with a full understanding of the differences in use and material. The Roman letter was cut in marble; the modern letter in sandstone. Both were incised in the V-sunk section, but the differences in material will at once indicate that the modern letter could not have been cut as clearly nor as deeply as the old one. The modern letter was done a little more than twice the original size of the old one, which explains certain subtleties in its outline as here drawn. The sandstone being a darker material than the marble, the letter should of necessity be heavier and larger in the same location, in order to "carry" or be distinguishable at the same distance; while the Classic example, being sharply and deeply cut in a beautiful white material which even when wet retains much of its purity of color, would be defined by a sharper and blacker outline, and therefore be more easily legible, other conditions being the same, even for a longer distance. In both these figures, the composition of the letters may be seen to advantage, as in even the Classic example, where they are alphabetically arranged, they are placed in the same relation to each other as they held in the original inscription. A complete alphabet of the letter shown in word use in Fig. 24, is shown at larger size in Fig. 25.

Although the lettering of the Italian Renaissance period was modeled closely after the Classic Roman form, it was influenced by many different considerations, styles and peoples.

VITRUVIUS
APOLLODORUS
CALLICRATES
POLYCLITUS
DINOCRATES

Fig. 24. Lettering from Harvard Architectural Building. McKim, Mead & White, Architects.

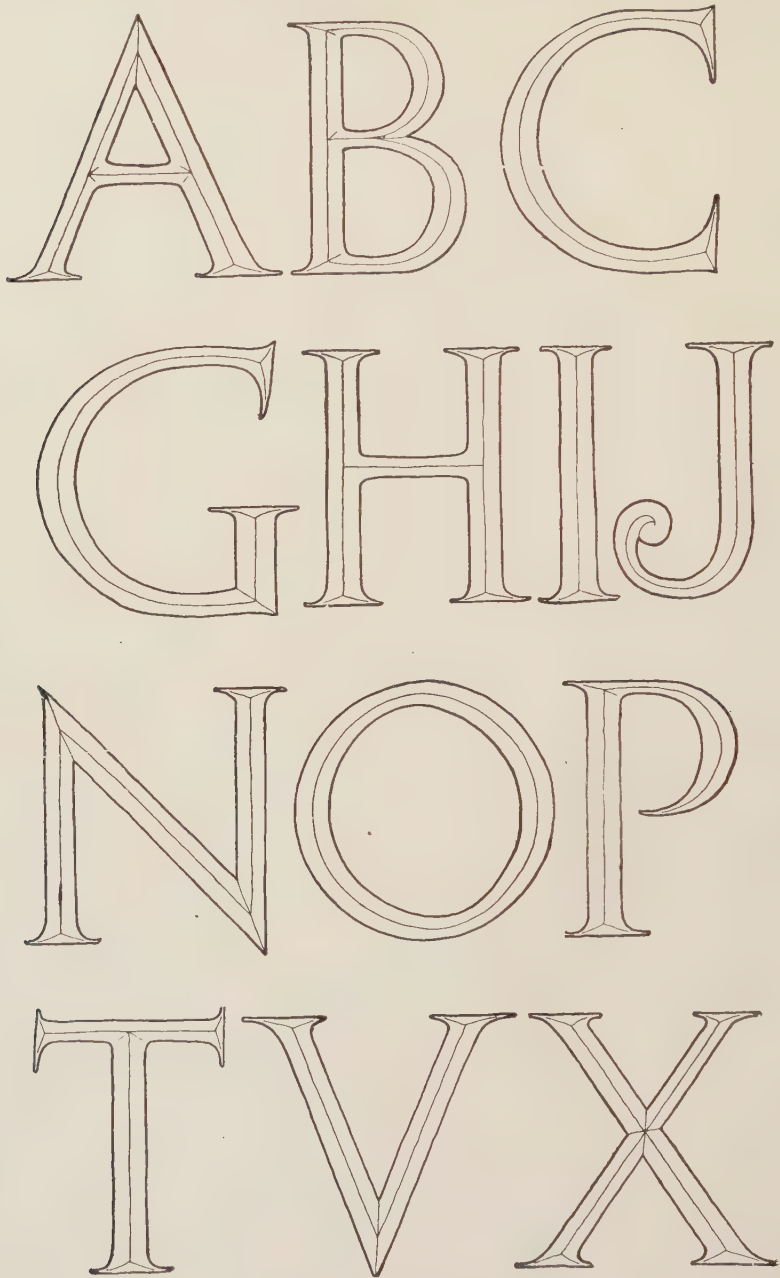


Fig. 25. Complete Alphabet.
Redrawn from Inscription on Architectural Building (See Fig. 24).

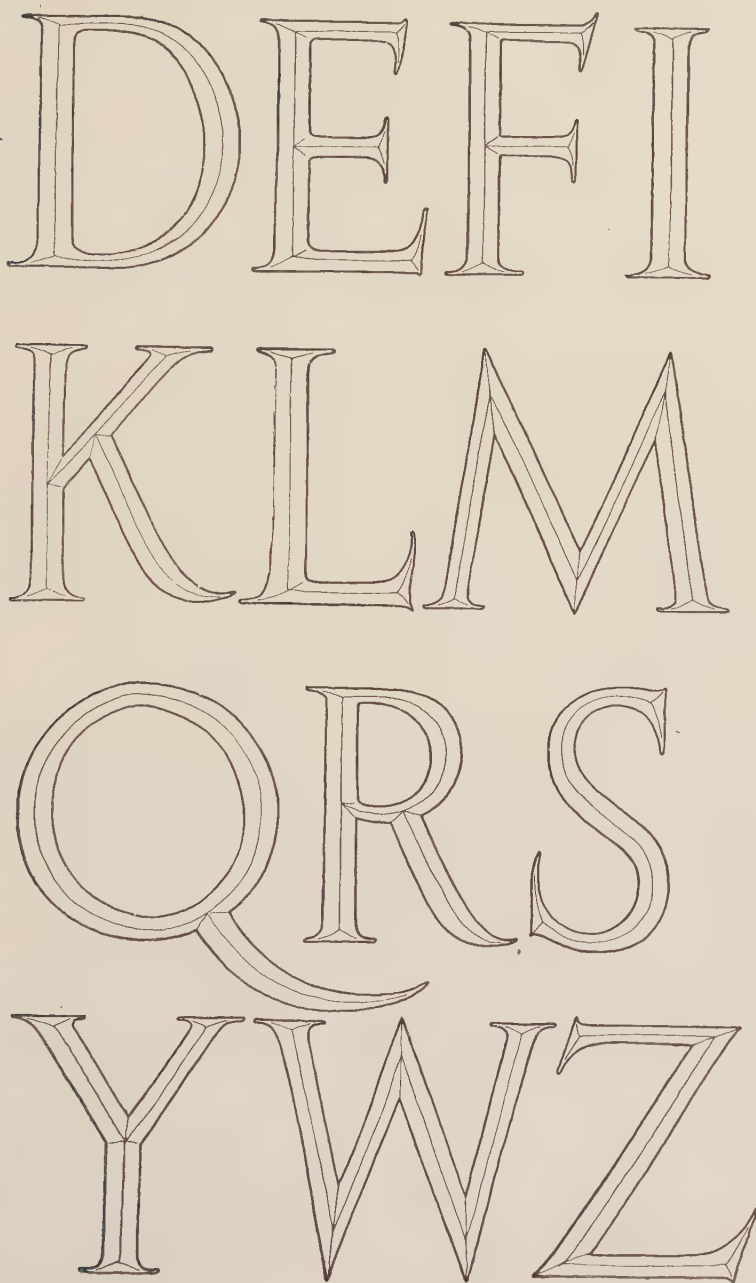
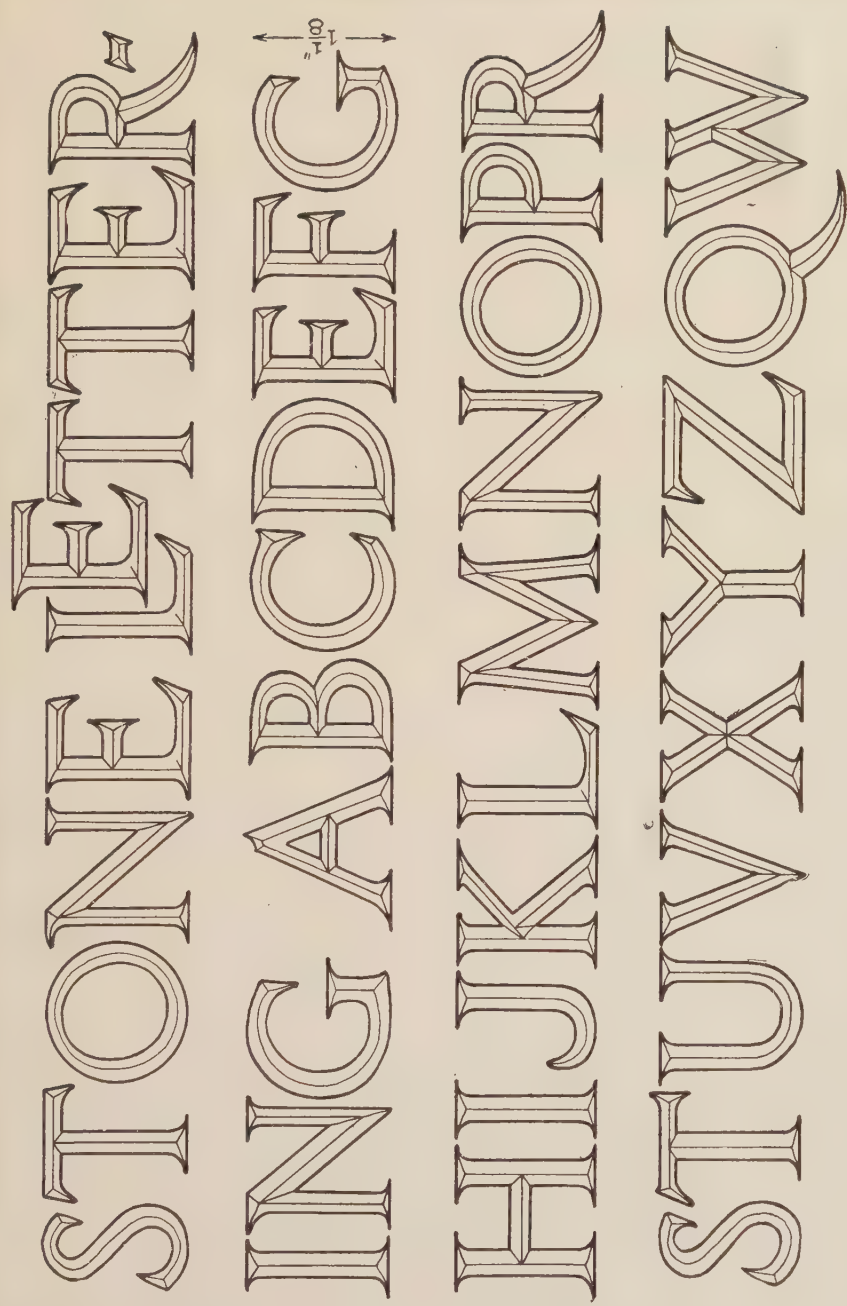


Fig. 25. (Continued)

MARMORA
I INGENIO C
QVAE NATV
KAROLVS I
AVSONIAE 7
OCCIDIT
OM NOVIT.

Fig. 26. Fragment of Italian Renaissance Inscription.
From the Marsuppini Tomb in Florence.



ALPHABET OF MODERN CAPITAL LETTERS OF ITALIAN RENAISSANCE CHARACTER.

Suitable for cutting at a small size (i. e. $1\frac{1}{2}$ inches high) in stone.

ANNO DNI MDCXCIV
REVEREXCELLACD
CREBSEIADHVVS
NOTARIVS APOSTOL
CIP IVLII CANCELLA

ITALIAN RE-
NAISSANCE
LETTERING
A B C D E F G
H I J K L M N E
O P Q R S T U
V X W Y Z

Fig. 27. Italian Renaissance Lettering.
Adapted from Inscription shown in Fig. 26.

In Fig. 26 is shown a fragment of the inscription on the Marsuppini tomb at Florence. This outline letter was traced from a rubbing, and shows very nearly the exact character of the original, a marble incised letter. Fig. 27 is an alphabet devised

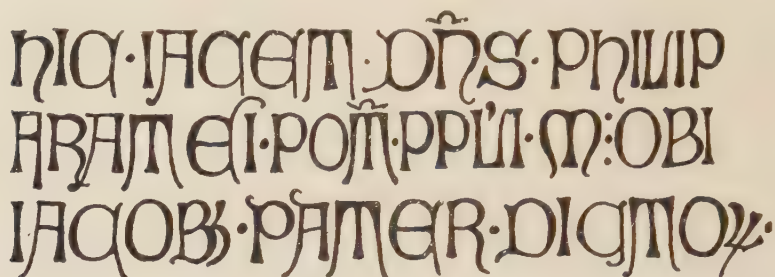


Fig. 28. Italian Renaissance Inscription at Bologna.

from this incised letter for use as a pen-drawn form and redrawn at the same size. It will be noticed that in the letters shown in the four lower lines a quite different serif* treatment has been adopted, and certain of the letters, such as the E's, have been

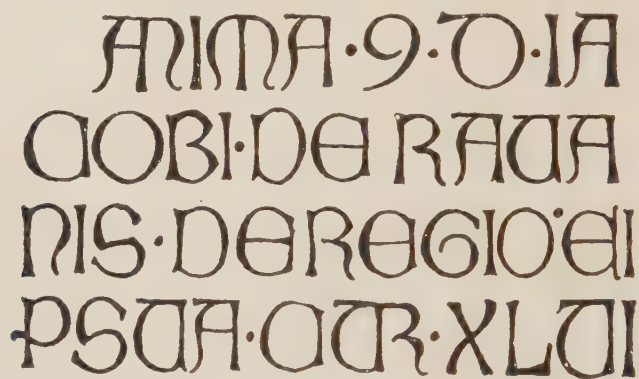


Fig. 29. Italian Renaissance Inscription, Chiaravalle Abbey in Milan.

“extended” or made wider in proportion. These variations are such as modern taste would generally advocate, but in the first three lines of this plate the feeling, serif treatment and letter width of the original have been retained; the only change has

*NOTE. The “serif” is the short spur or cross stroke used to define and end the main upright and horizontal lines of the letter.

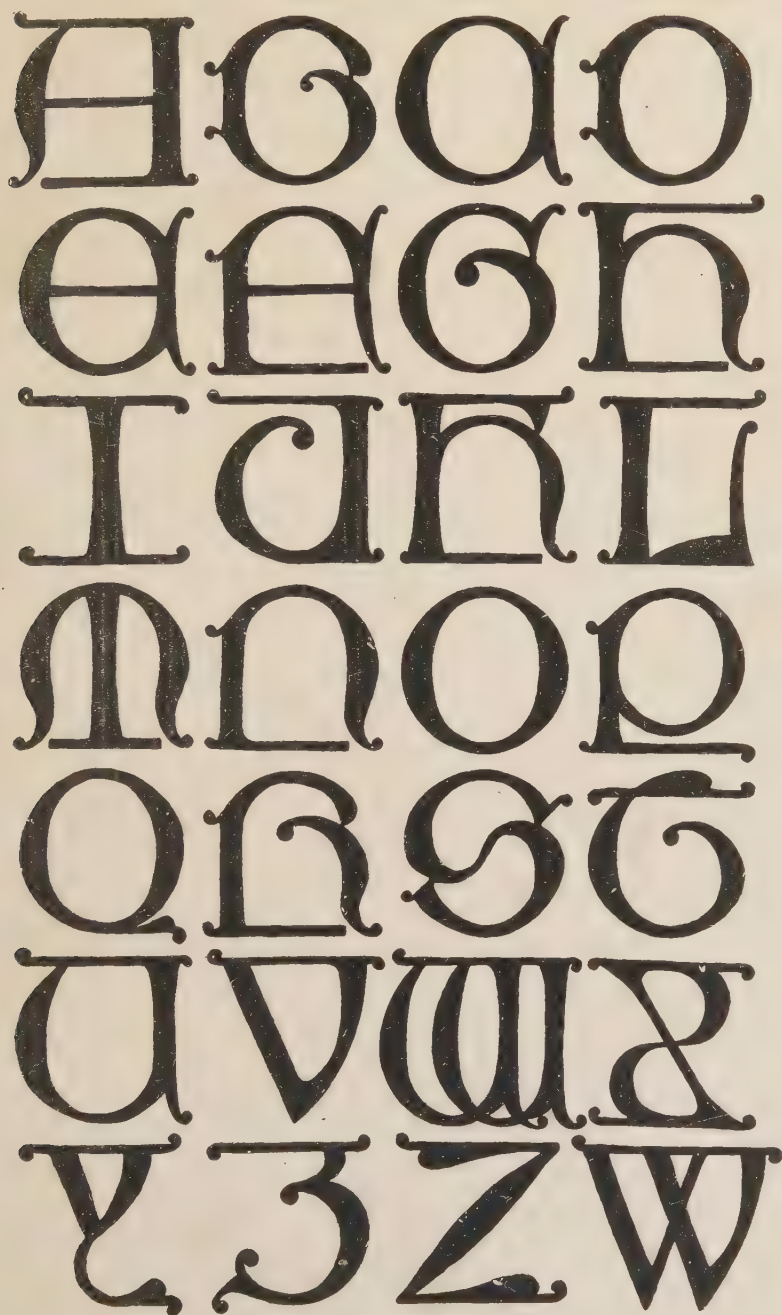


Fig. 30. Alphabet of Uncial Gothic Capital Letters, 16th Century.

been to narrow up the thin lines in relation to the thick lines to the proportions that they should have in a solidly black and inked-in letter form.

The two small panels, one from a monument in Bologna, and one from the Chiaravalle Abbey in Milan, Figs. 28 and 29, show a letter which was incised in stone and follows the so-called uncial or round form, with characteristics showing the probable influence of the Byzantine art and period. These two inscriptions may be compared with another alphabet showing the uncial character when used in black against a white page, as in Fig. 30. This same style of letter was often used in metal, and may be seen in many of the mortuary slabs of this and succeeding periods.

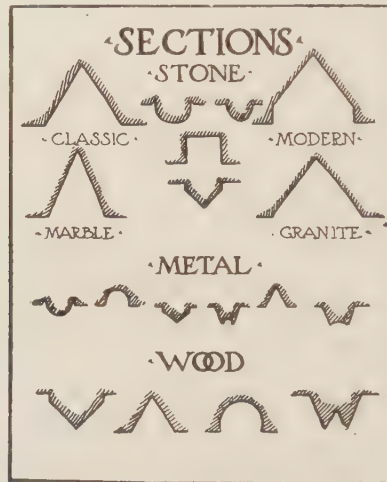


Fig. 31. Inscription Letter Sections.

In many of the Renaissance wall monuments the V-sunk letter sections have been filled with a black putty to make the letter very clear, and when this falls out, as it often does, the V-cut section may still be seen behind it. Also in many Italian floor slabs the letters are either V-sunk or shallow, square sinkages filled with mastic, or sometimes they are of inlaid marble of a color different from the ground. Again a V-sunk letter section sometimes carries an additional effect because it is smoothly cut

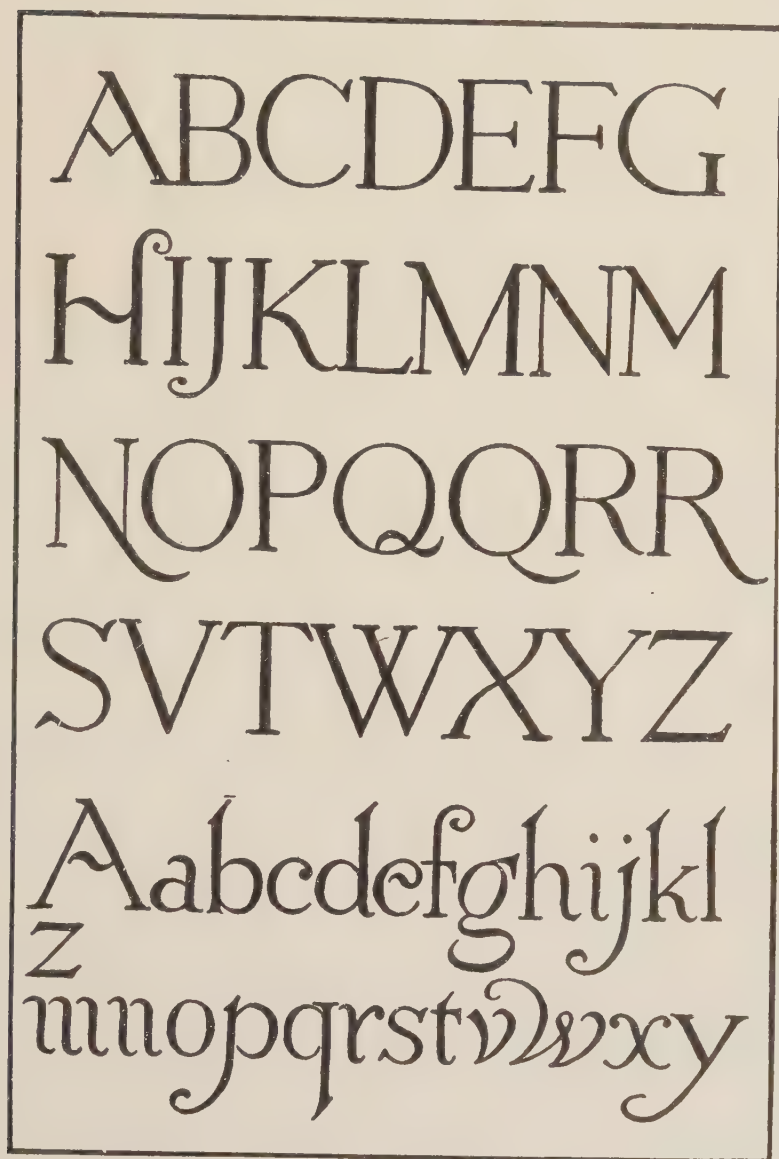


Fig. 32. English 17th Century Letters, from Tombstones.

and finished and the surface of the stone is left rough, thus obtaining a different texture and color effect; or, though more rarely, the opposite treatment may be used. Then, again, the sides of the letter sinkage may be painted or gilded. Often even the shadow is painted into the section, but this is generally done on interior cutting where there is no direct light from the sun, because if direct sunlight does fall upon a letter so treated, a very amusing effect occurs when the shadow is in any other position than that occupied by the painted representation.

For still further effects, *raised lettering* may be cut on stone surfaces. This is more expensive, as it necessitates the more labor in cutting back the entire ground of the panel, but for certain purposes it is very appropriate.

In such a letter the section may be a raised V-shape, or it may be rounded over to make a half circle in section, as drawn in Fig. 31. This latter form is especially effective in marble, but it is, of course, very delicate and does not carry to any great distance. Its use should be restricted to small monumental headstones or to lettering to be read close to, and below the level of, the eye.

A raised letter is more generally appropriate for cast copper and bronze tablets, when its section may be a half round, a raised V-form, or square-raised with sharp corners; or, better still, a combination of square and V-raised with a hollow face. See Fig. 31. Experience has proved that this last-named section produces the most telling letter for an ordinary cast-metal panel.

Fig. 32 shows an alphabet of a letter derived from English tombstones. This letter was cut in slate or an equally friable material, and was comparatively shallow. A certain tendency toward easing the acute angles may be observed in this alphabet, evidently on account of the nature of the material in which it was carved rendering it easily chipped or broken.

In wood carving, a letter exactly reversing the V-sunk section with direct sinkage, gives the best effect for a raised letter.

Every material, from its nature and limitations, requires special consideration. A letter with many angles is not adapted to slate, as that material is liable to chip and sliver; hence an

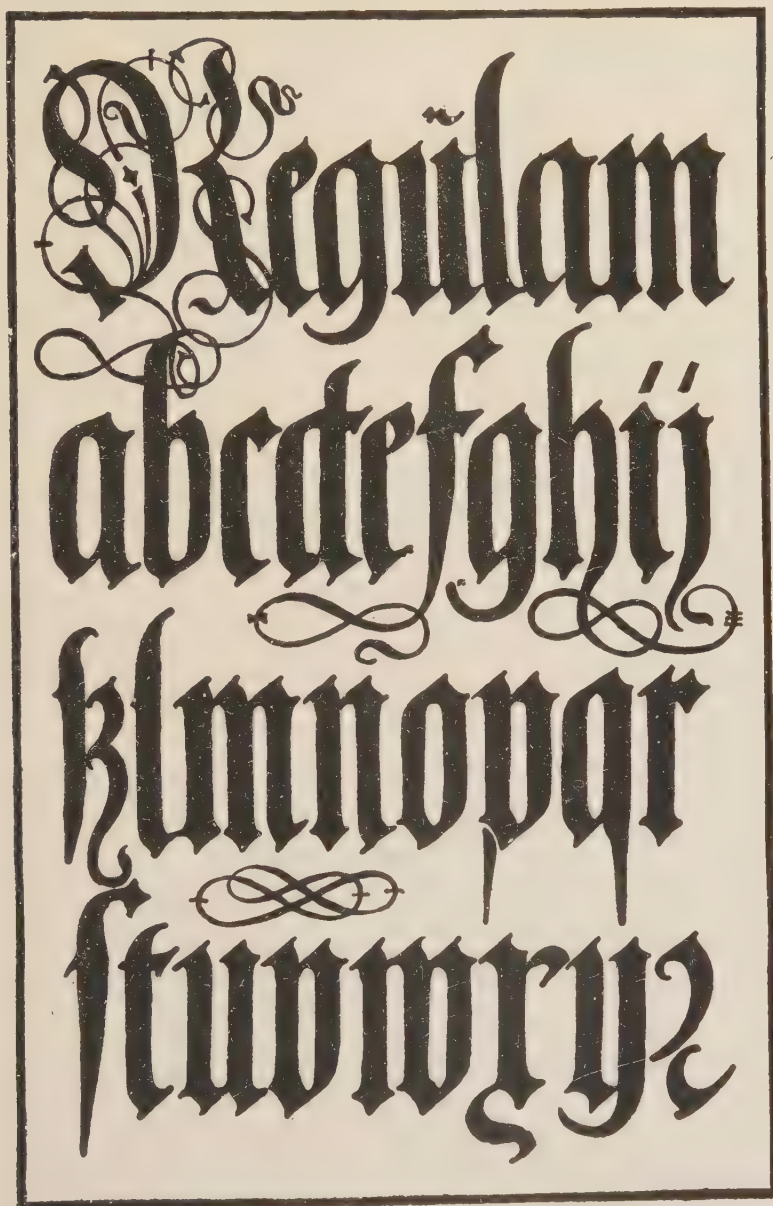


Fig. 33. German Black Letters, from a Brass.

uncial form with rounded angles suggests itself (as in Fig. 29), and is, indeed, frequently used.

It would be quite impossible to take up in detail the entire list of available materials and consider their limitations at length, as the task would be endless. For the same reason, it is not possible to take up each letter style and consider its use in stone and other materials. Of course, a Roman letter or any other similar form when drawn for stone-incised use must have its narrow lines at least twice as wide as when drawn in ink, black against a white background. (Compare Figs. 26 and 27.)

Experience and intuition combined with common sense will go farther than all the theory in the world to teach the limitations

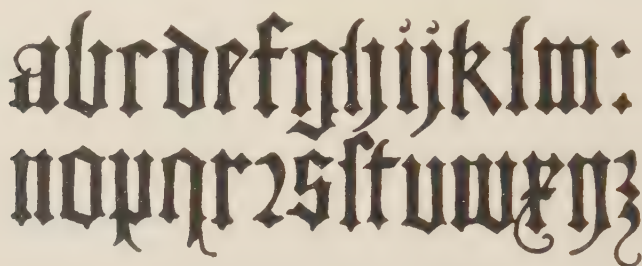


Fig. 34. Black-Letter Alphabet.

required by letter form and material. The student, however, should bear in mind that it is not necessary that he himself should make a number of mistakes in order to learn what *not* to do. He may get just as valuable information at a less cost by observing the mistakes and successes of others in actually executed work, and avail himself of their experience by applying it with intelligence to his own problems and requirements.

GOTHIC LETTERING.

Gothic lettering is extremely difficult, and has little practical use for the architectural designer or draftsman. It is often appropriate, but it is quite possible to get along without employing this form at all. However, in case he should require a letter of this style, it would be better to refer him to some book where he may study its characteristics more particularly, remembering it is just as important he should know something of the history,

uses and materials from which this letter has been taken, as in any instance of the use of the Roman form. Indeed, it might be

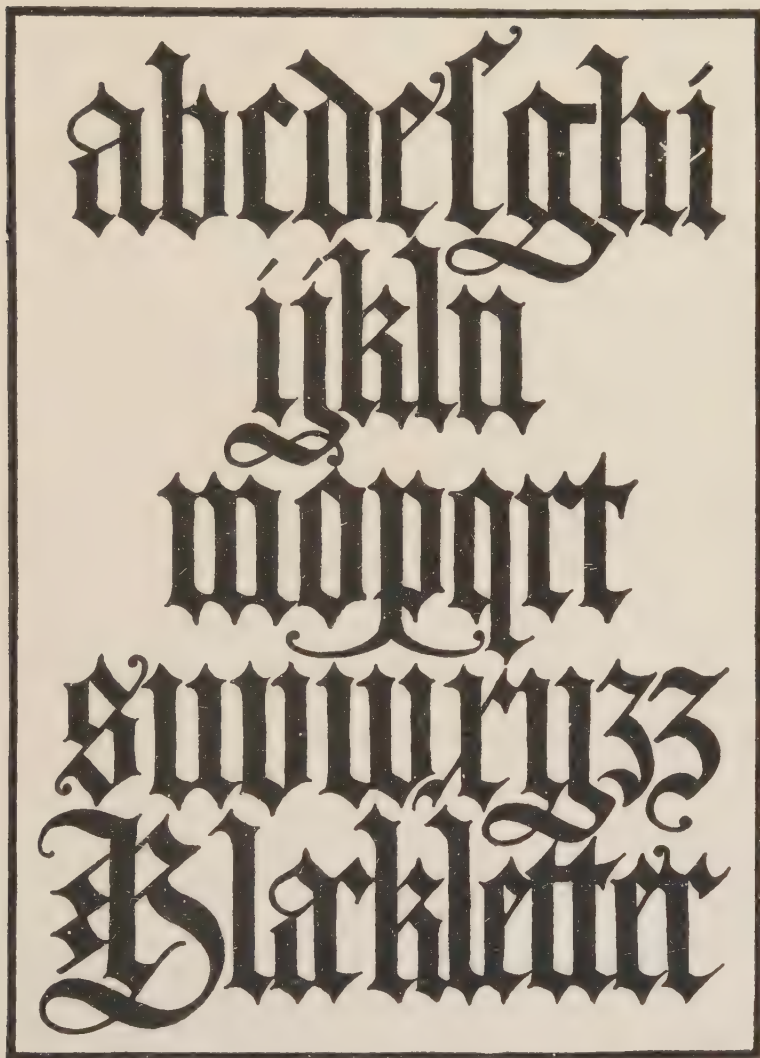


Fig. 35. Italian Black Letters, after Bergomensis.

said, it is even more important, as the Gothic letter is more universally misunderstood and misapplied than the simpler Roman letter.

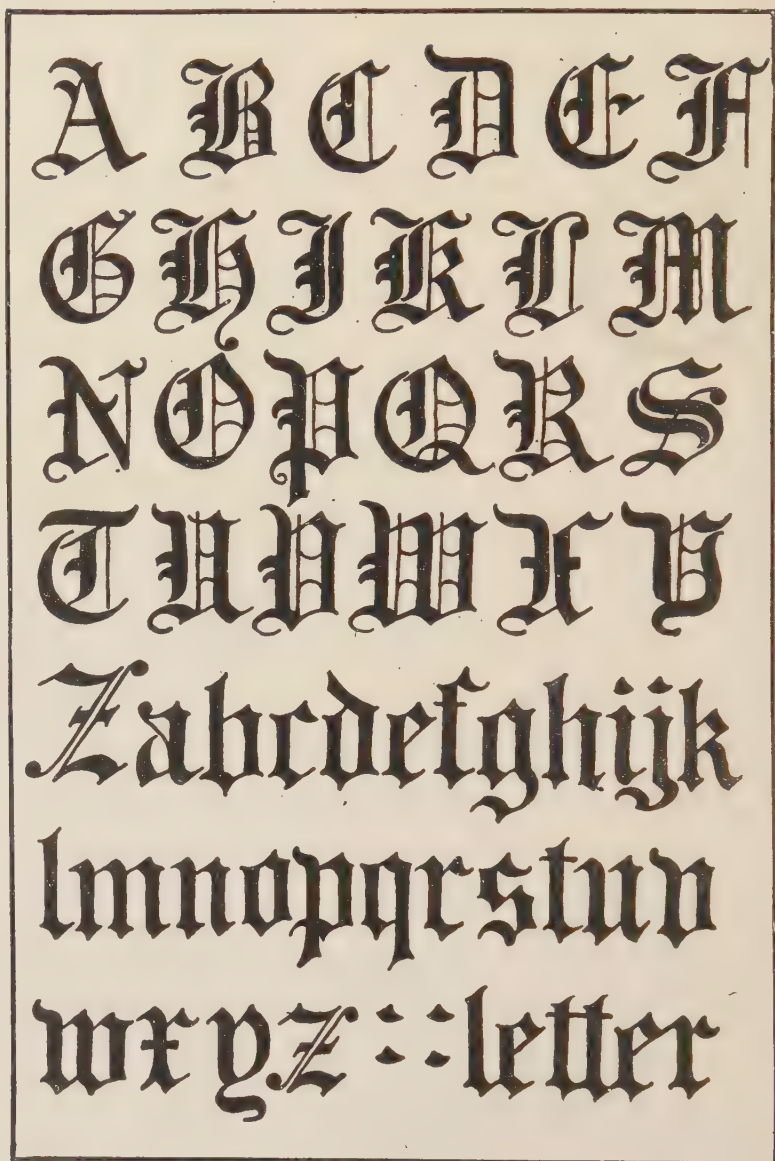


Fig. 36. English Gothic Text.

The alphabet of German black letters shown in Fig. 35 is taken from a very beautiful example of Gothic black letter devised by Jacopus Phillipus Foresti (Bergomensis) and used by him in the title page of "De Claris Mulieribus," etc., published in Ferrara in 1497. Although Italian, this letter is as German in character as any of the examples from the pen of Albrecht Dürer. A German black letter redrawn from a brass is shown in Fig. 33, while an English form of Gothic letter is shown in Fig. 36.

In Fig. 34 is another example of a black-letter alphabet. The entire effect of a black-letter page depends upon the literal interpretation of the title "black letter." That is, the space of white between and among the letters should be overbalanced by the amount of black used in defining the letter form itself.

Inasmuch as this letter is likely to be used but little by architectural draftsmen, and as it is a much more difficult form to compose than even the Roman type, it seems better to refer the student to some treatise where its characteristics are taken up more thoroughly and at greater length.

Any draftsman having occasion to use lettering to any extent should have some fairly elaborate textbook always at hand for reference, and it is believed that "Letters and Lettering," a larger treatise published by the Bates and Guild Company of Boston, from which several of the illustrations reproduced in this pamphlet have been borrowed, contains more material in an easily available form than any other textbook on the subject.

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JOSEPH A HICKEY,
ARCHITECT.

310 STRAND BUILDING, PROVIDENCE, R. I.

Hickey

Col. S.

Col. Joseph A. Hickey

